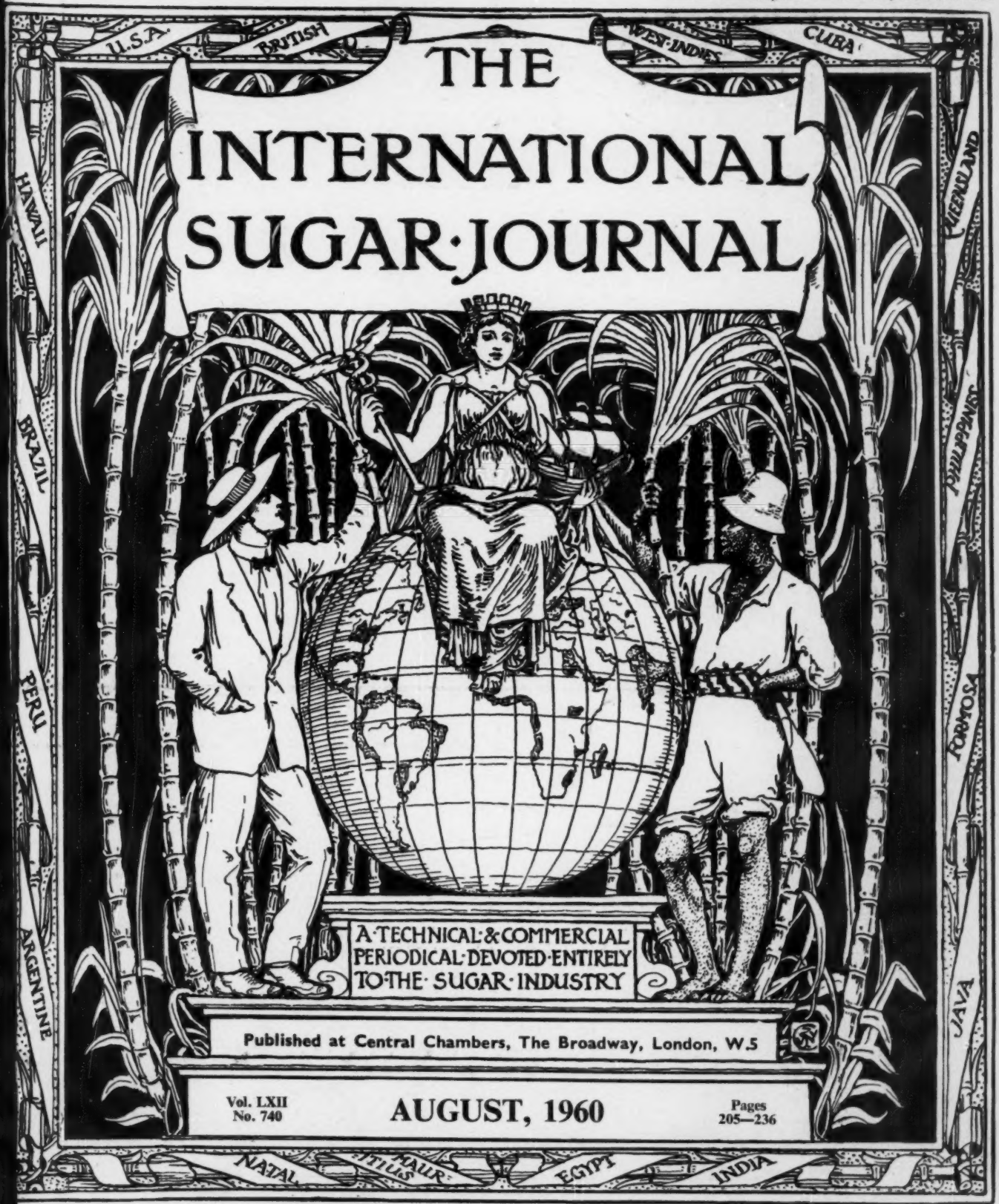
2s 6d or 45 cents net
Annual Subscription £1 12s or $5·00 Post Free



THE INTERNATIONAL SUGAR JOURNAL

A TECHNICAL & COMMERCIAL PERIODICAL DEVOTED ENTIRELY TO THE SUGAR INDUSTRY

Published at Central Chambers, The Broadway, London, W.5

Vol. LXII
No. 740

AUGUST, 1960

Pages
205—236

For LIST OF ADVERTISERS see page xlvi

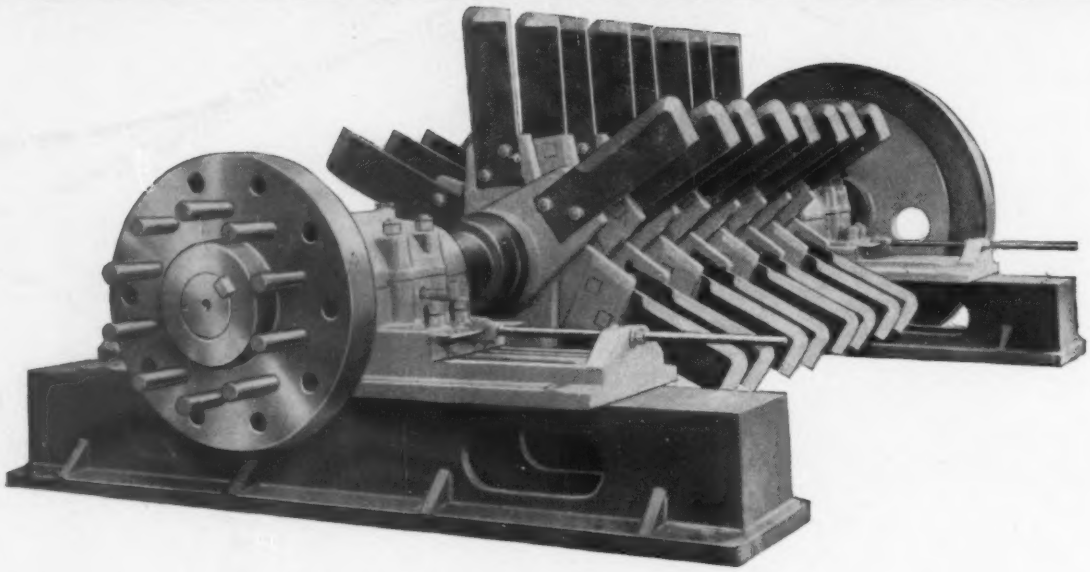
BLAIRS

COMPLETE

SUGAR

FACTORIES & REFINERIES

DISTILLERIES, ABSOLUTE ALCOHOL & CHEMICAL PLANTS



Our illustration shows the rotating element of one of our Standard Heavy Duty Cane Cutters suitable for operating on a 84" wide Cane Carrier. The element is fitted with 48 special Steel Knives 5' 0" diameter over tips. The shaft is fitted with flexible coupling and is driven direct by an Electric Motor.

BLAIRS LIMITED

WOODVILLE STREET · GLASGOW S.W.1

Cables — "BLAZON GLASGOW"

LONDON OFFICE —38 GROSVENOR GARDENS, S.W.1 · Cables — "MULTIVAP SOWEST LONDON"

SUGAR CENTRIFUGAL ASSEMBLY AND TESTING

Many customers arrange to have the centrifugal supporting structure made locally, working to Broadbent's drawings.

Centrifugals supplied to these customers are tested in our permament test frames on the left of the photograph.

BROADBENT

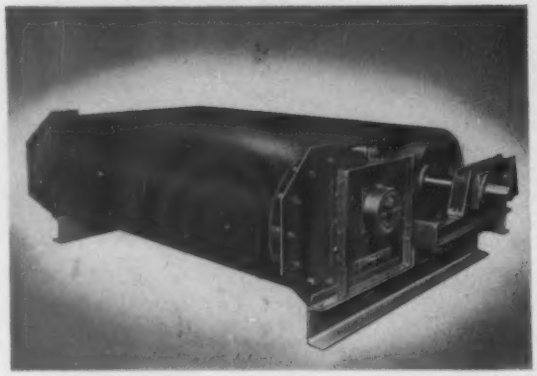
THOMAS BROADBENT & SONS LTD . CENTRAL IRONWORKS . HUDDERSFIELD . ENGLAND

The World's largest manufacturer concentrating entirely on industrial centrifugals

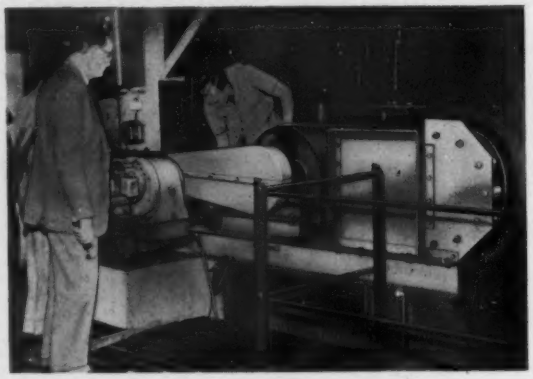
Telephone 5520-5

Telegrams: BROADBENT HUDDERSFIELD

MAGNETIC CONVEYOR HEAD



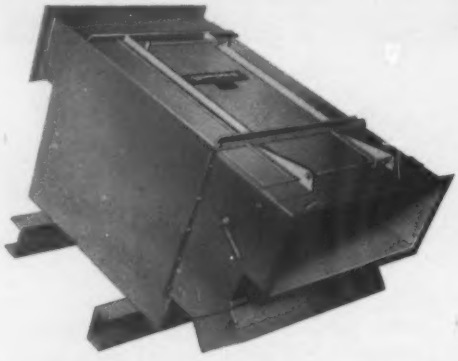
Boxmag patent MH. 2484. Conveyor Head built into an 84" wide short belt conveyor, photographed prior to despatch. The machine is designed for installation, as shown on the adjacent illustration.



Boxmag patent MH. 2484 installed in the chute between a sugar cane carrier and crusher, at a factory in Mauritius. It is designed to remove tramp metal automatically and continuously without an operator's attention. (write for leaflet 62/2).

MAGNETIC SEPARATORS PROTECT MACHINERY AND PRODUCTS

(Write for further details)



Boxmag Superflux Magnetic Chute for removal of ferrous contamination from refined sugar to decontaminate the product.

A Boxmag Unimajor block type Permanent Magnet. One of the many types of separators suitable for general applications in sugar factories. (write for details of full range).

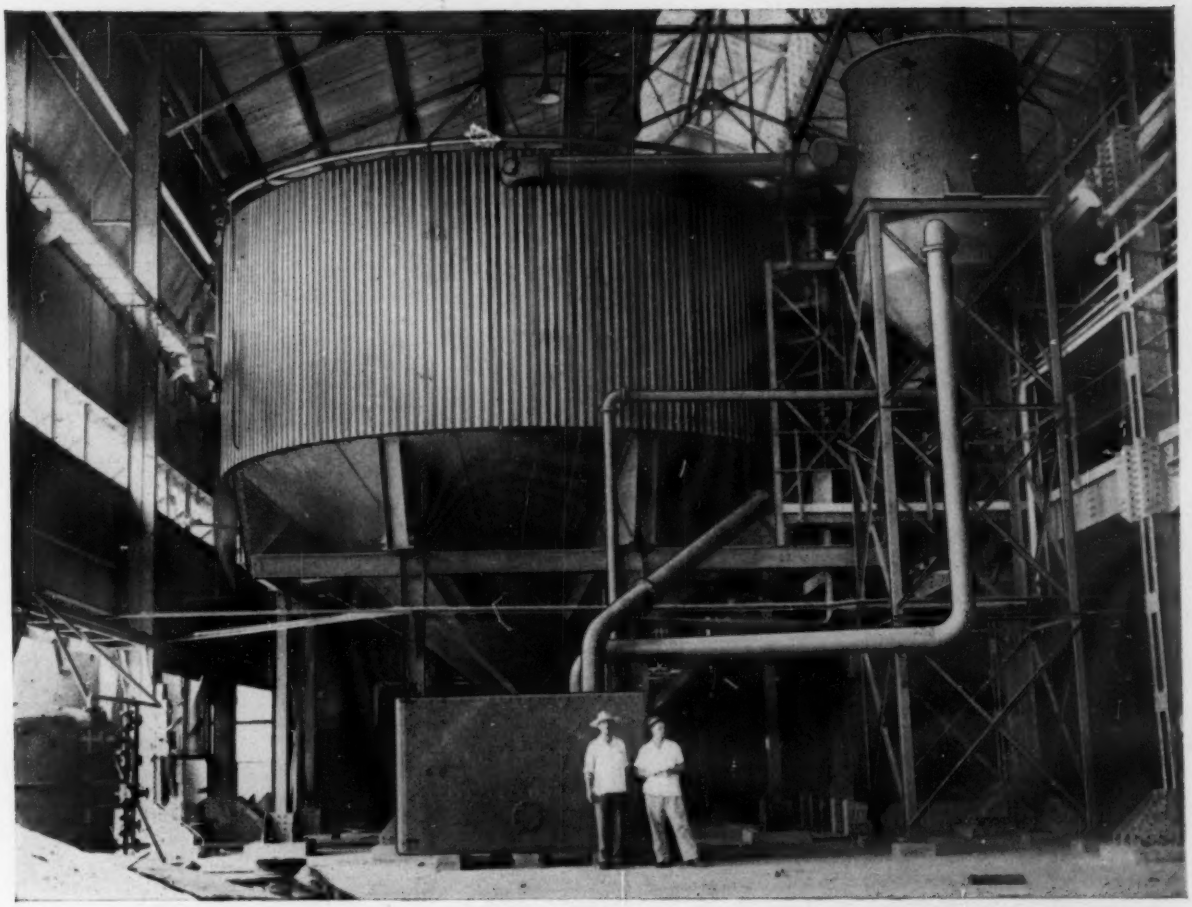
BOXMAG

Telephone
Central 5391

Telegrams :
Boxmag Birmingham

ELECTROMAGNETS LTD

BOXMAG WORKS · BOND ST. · HOCKLEY · BIRMINGHAM 19 · ENGLAND



'Mirrlees'

BACH CONTINUOUS SUBSIDERS

Illustrated is one of our most recent installations, a 30 feet, 5 tray Subsider in operation in Venezuela.

This Subsider enables juice to be drawn off at 5 points of optimum clarity. Surface evaporation is obviated, no surface scum enters the tank, and a high temperature is maintained throughout the apparatus.

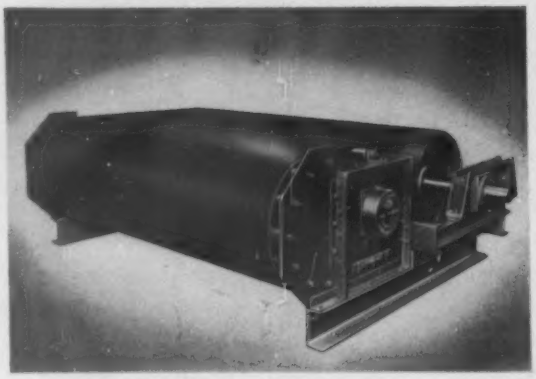
SEALED 'Mirrlees' "Bach" CLARIFICATION

The MIRRLEES WATSON COMPANY LIMITED

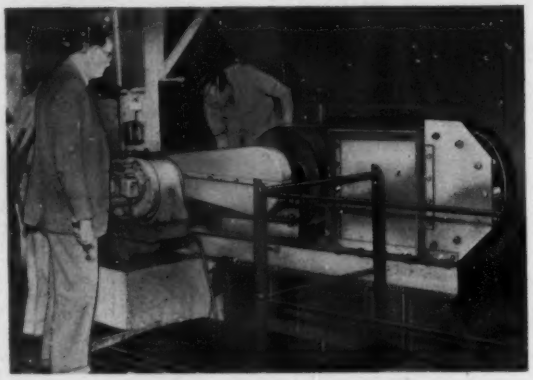
SCOTLAND STREET GLASGOW, C.5

London Office: 38 GROSVENOR GARDENS, S.W.1

MAGNETIC CONVEYOR HEAD



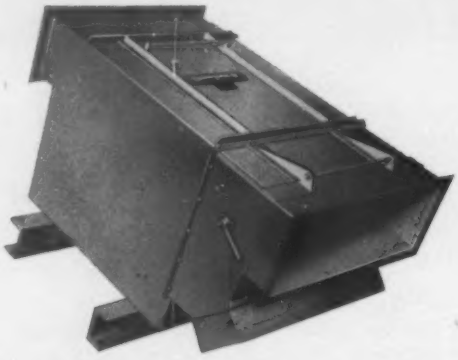
Boxmag patent MH. 2484. Conveyor Head built into an 84" wide short belt conveyor, photographed prior to despatch. The machine is designed for installation, as shown on the adjacent illustration.



Boxmag patent MH. 2484 installed in the chute between a sugar cane carrier and crusher, at a factory in Mauritius. It is designed to remove tramp metal automatically and continuously without an operator's attention. (write for leaflet 62/2).

MAGNETIC SEPARATORS PROTECT MACHINERY AND PRODUCTS

(Write for further details)



Boxmag Superflux Magnetic Chute for removal of ferrous contamination from refined sugar to decontaminate the product.

A Boxmag Unimajor block type Permanent Magnet. One of the many types of separators suitable for general applications in sugar factories. (write for details of full range).

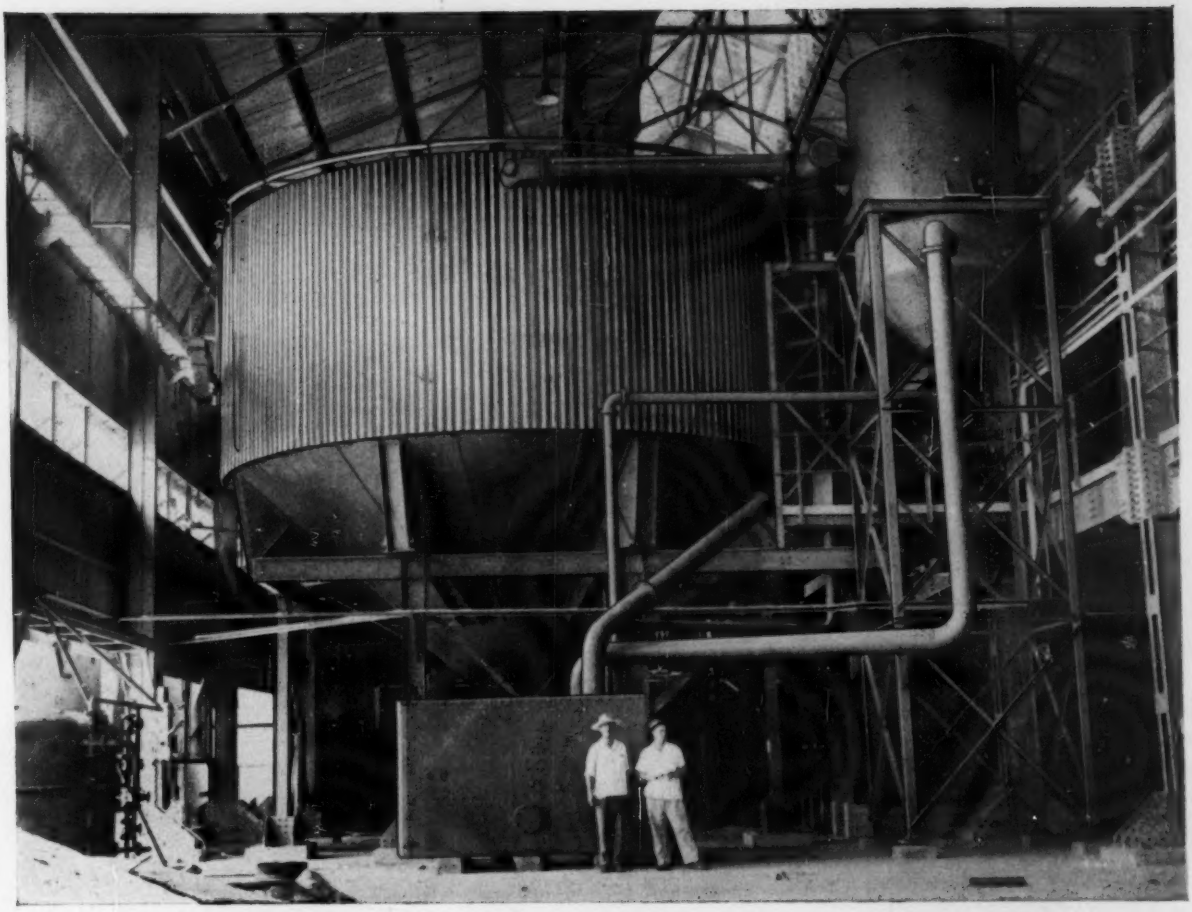
BOXMAG

Telephone
Central 5391

Telegrams :
Boxmag Birmingham

ELECTROMAGNETS LTD

BOXMAG WORKS · BOND ST. · HOCKLEY · BIRMINGHAM 19 · ENGLAND



'Mirrlees'

BACH CONTINUOUS SUBSIDERS

Illustrated is one of our most recent installations, a 30 feet, 5 tray Subsider in operation in Venezuela.

This Subsider enables juice to be drawn off at 5 points of optimum clarity. Surface evaporation is obviated, no surface scum enters the tank, and a high temperature is maintained throughout the apparatus.

SEALED 'Mirrlees' 'Bach' CLARIFICATION

The MIRRLEES WATSON COMPANY LIMITED

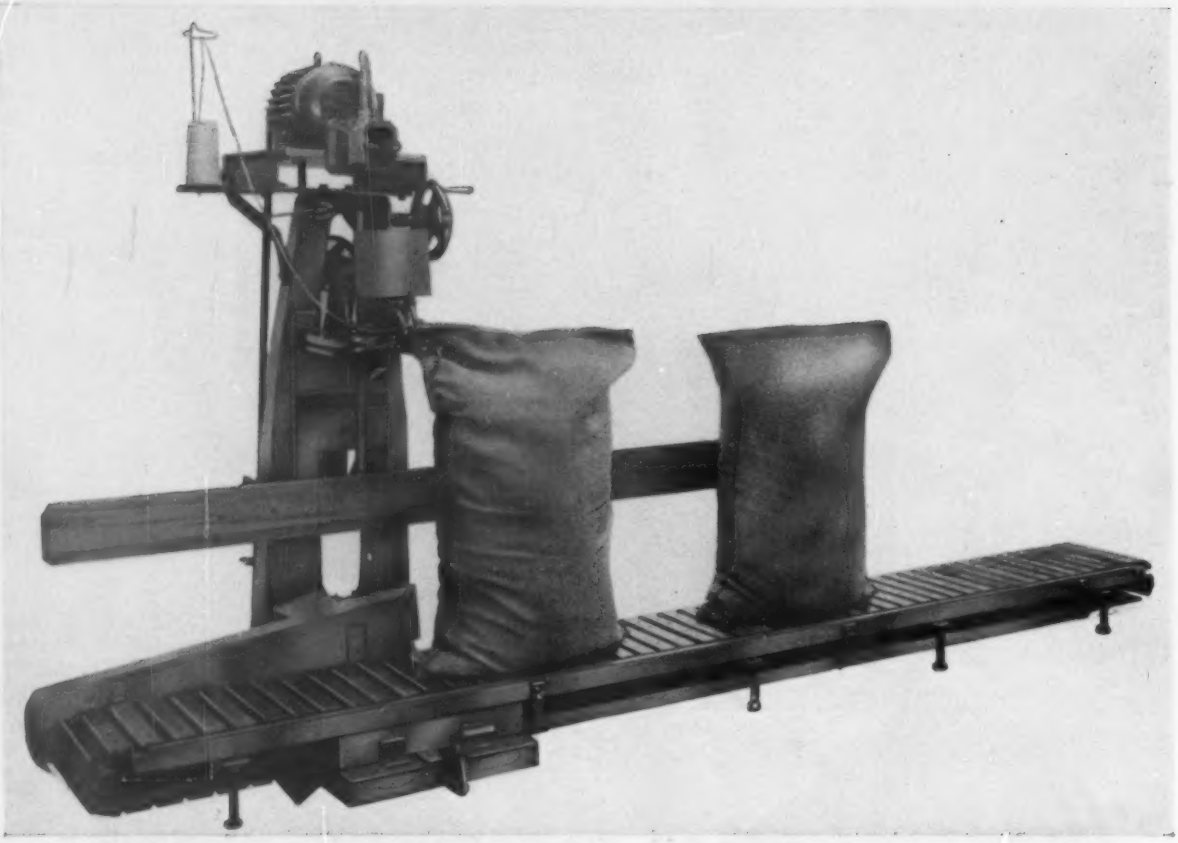
SCOTLAND STREET GLASGOW, C.5

London Office: 38 GROSVENOR GARDENS, S.W.1

The 'Super' Universal Sack Closing Machine

MODEL NO. 5B

Fitted with 10 or 12 ft. Conveyor and Special Clutch Drive



This machine is fitted with a conveyor 10 or 12 ft. overall and a Special Clutch Drive which allows the conveyor to be run independently of the sewing head.

Jute, Hessian, Paper Lined Hessian, Cotton and Paper Sacks weighing from 50 to 325 lbs. can be sewn on this machine.

Machines can be seen working by appointment.

Power required 2 h.p. *Shipping weight : 14 cwts.*

Manufactured in Great Britain by :

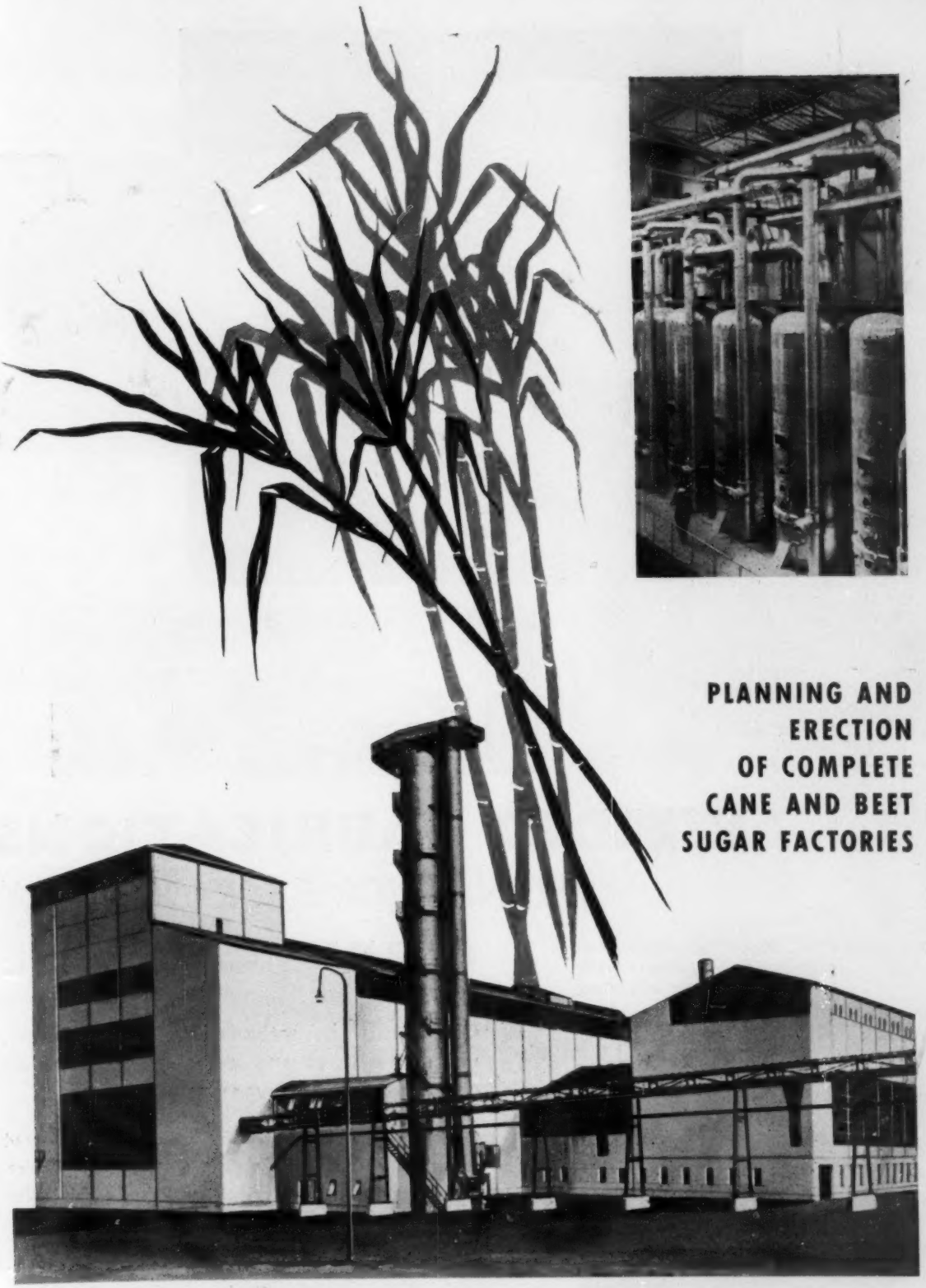
The Sack Filling & Sewing Machine Syndicate Limited

(Timewell's Patent)

TIMEWELL WORKS · LOCKFIELD AVENUE · BRIMSDOWN · ENFIELD . MIDDX.

Telephone : HOWARD 1188 *Telegrams :* FECIT, ENFIELD

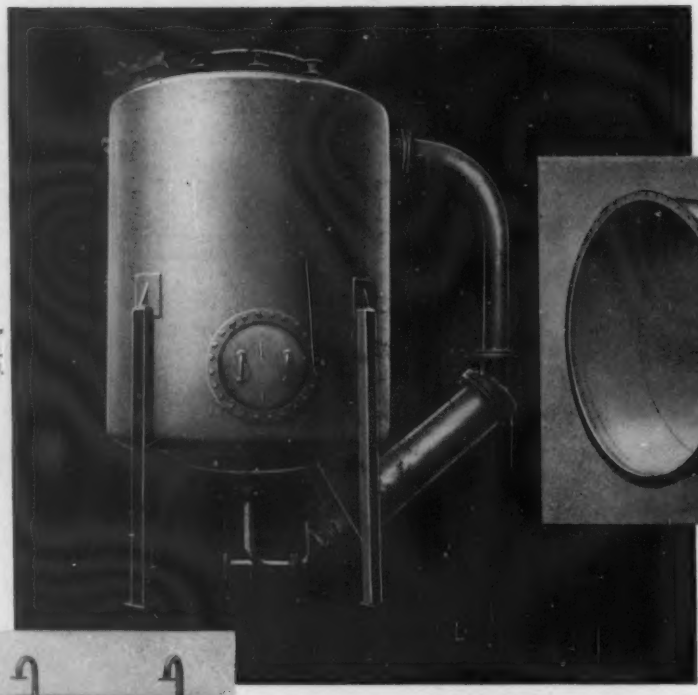
PLANNING AND ERECTION OF COMPLETE CANE AND BEET SUGAR FACTORIES



SALZGITTER INDUSTRIEBAU-GESELLSCHAFT M.B.H.

VORMALS: DEUTSCHE BERGWERKS- UND HÜTTENBAU GESELLSCHAFT M.B.H.

SALZGITTER-DRÜTTE / WESTERN GERMANY



1,000 gall. kettle in ¼" copper. Lynx Quasi-arc welded.

Stainless steel vessel with mild steel jacket

12,000 gallon water separator

WELDED FABRICATIONS

ORDINARY OR EXTRAORDINARY

CLARKS CAN COPE

STAINLESS STEEL, MILD STEEL, ALUMINIUM FABRICATIONS COMPLETE WITH VALVEWORK AND PIPEWORK

METALLIC ARC WELDING

ARGONAUT AND ARGON-ARC WELDING

STRESS-RELIEVING AND TESTING FACILITIES

CLARK

GEORGE CLARK & SONS (HULL) LIMITED
HAWTHORN AVENUE, HULL

Telephone 37654 *Telegrams 'Clark Hull'*

A MEMBER OF THE NEWMAN HENDER GROUP

Clark's modern methods, efficient equipment, unique facilities and practical approach all operate to your advantage....

Clarks offer you a unique combination of the most advanced equipment and methods with a century-old reputation for high craftsman standards on every type of fabrication work.

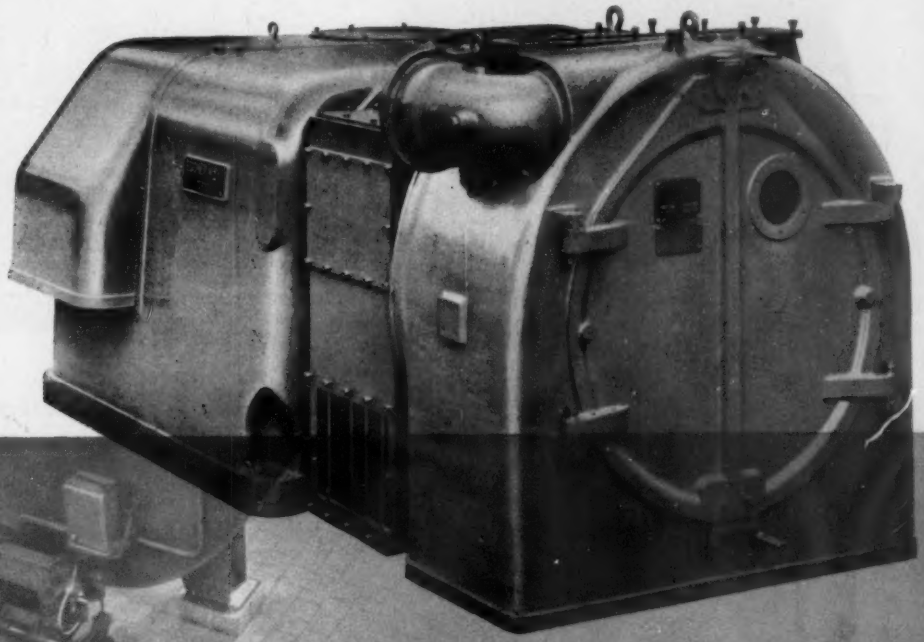
Stainless steel, mild steel, aluminium, copper or aluminium-bronze . . . Clarks of Hull will not only give you the practical solution to your problem—they'll deliver a first-class job on time !

Send that enquiry *first* to Clarks of Hull.

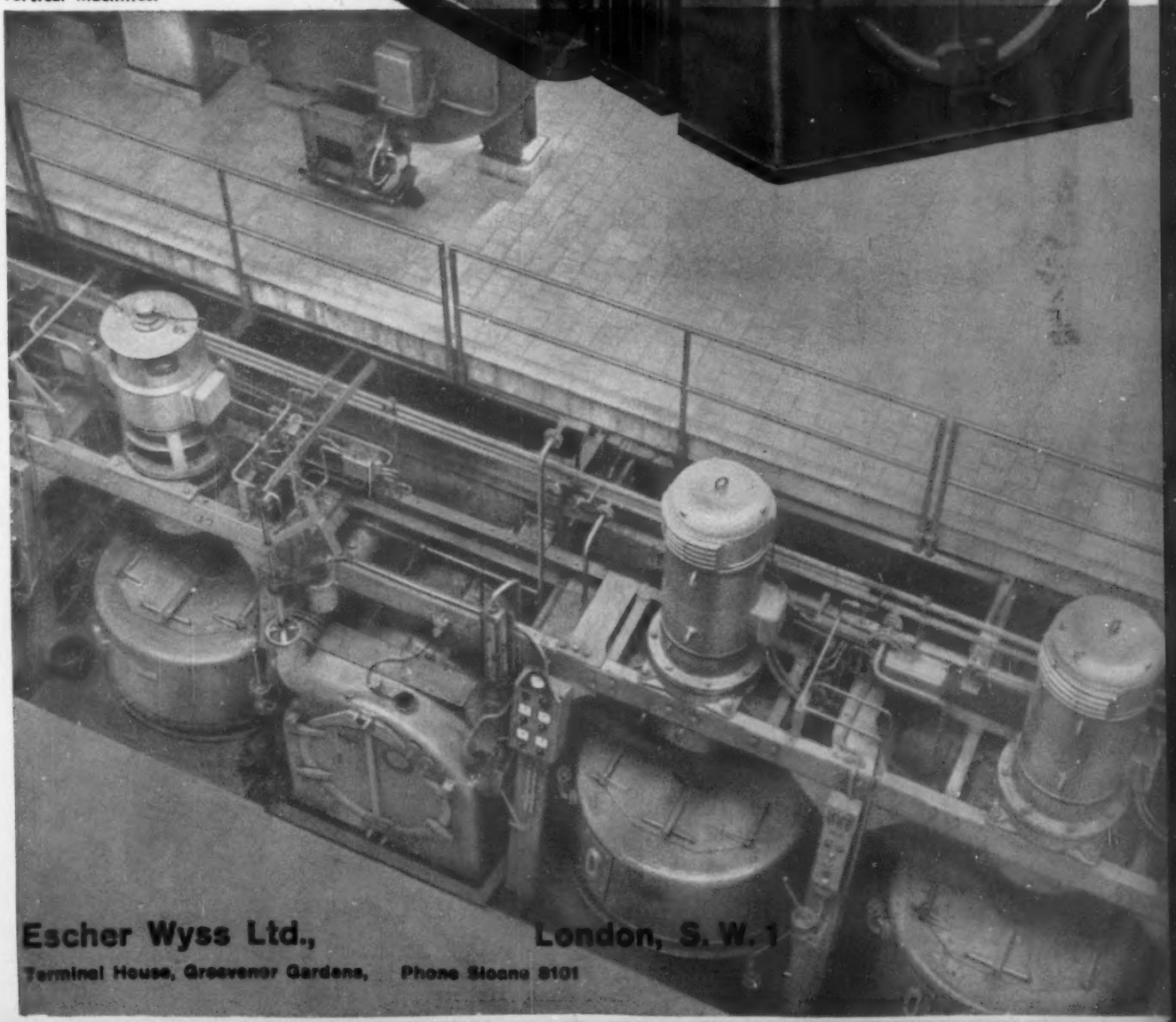
ESCHER WYSS

continuous centrifuges for the sugar industry

These centrifuges are in operation at Sugar Factories throughout the world.

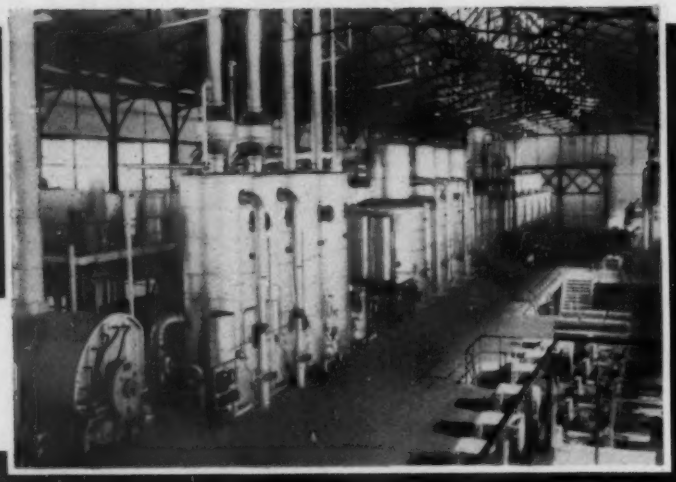


Escher Wyss Centrifuge as replacement in a battery of vertical machines.



Escher Wyss Ltd., **London, S. W. 1**

Terminal House, Grosvenor Gardens, **Phone Sloane 8101**

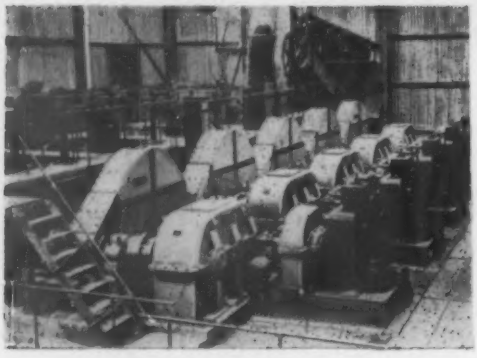


WE

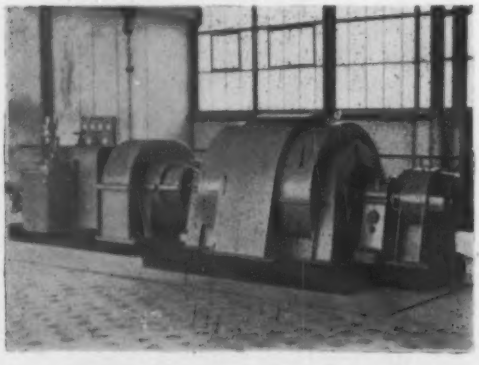
can supply everything for your cane or beet

SUGAR FACTORY

Set of five 26" x 36" mills.
Urena sugar factory (Venezuela)



1800 kW turbo-alternator.
Malatya sugar factory (Turkey)



BUILDINGS
- Steel structures

PROCESSING MACHINERY
- RT and DdS continuous diffusers
- Cane mills
- Liming and sulphitation units
- Clarifiers
- Filters
- Evaporators
- Vacuum pans
- Centrifugals

POWER EQUIPMENT
- Steam boilers
- Turbo-alternators
- Electric motors

HANDLING EQUIPMENT
- Cranes
- Conveyors

COMPLETE PLANTS

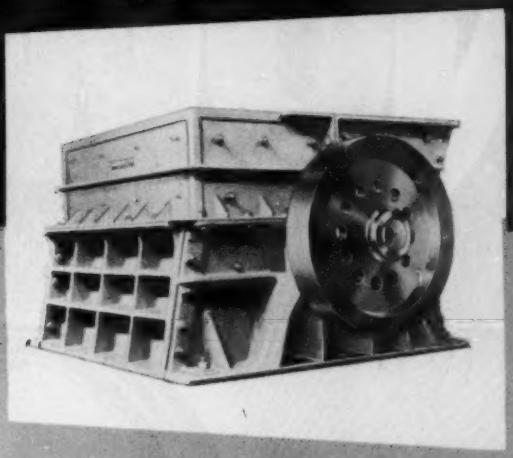
just write to :

FIVES LILLE - CAIL

7, rue Montalivet, PARIS (8e) - Tél.: ANJou 22-01 et 32-40

SAG - PARIS 1.147

THE GRUENDLER CANE SHREDDING PROCESS gives top performance ALL THE WAY . . . all over the world



- It increases sucrose extraction
- It increases capacity
- It lengthens roll life
- It produces better bagasse for fuel or paper-making
- And an additional and vital feature: . . . the design, engineering and construction of the Gruendler Cane Shredder prevents tramp metal from entering mill rolls where severe damage and costly shut-downs would result.

AN UNSOLICITED TESTIMONIAL IN GRUENDLER'S FILES STATES THE FOLLOWING:

"Because the shredder gives such a loud warning when tramp metal enters, the operator can remove the obstacle before it enters the mill tandem. We can sleep at night due to the elimination of worry from this score. If the shredder did nothing more than extract the iron from the mill we feel that this alone has paid for the entire shredder installation."

These men are holding a 190-lb. tyne from a crane grab that entered a Gruendler Shredder at Evan Hall Sugar Cooperative in Donaldsonville, La., U.S.A., but did not enter the mill! Mill maintenance is greatly reduced by the elimination of tramp iron such as this, which is very important in cane milling.

Photo shows an accumulation of tramp iron that entered the Gruendler Shredder at a mill in Peru. Any of these pieces could have been responsible for a long and costly shut-down of the mill.

IT'S GOOD BUSINESS TO ADOPT THE GRUENDLER CANE SHREDDING PROCESS

GRUENDLER CRUSHER & PULVERIZER CO.

ESTABLISHED 1885

2915 North Market
St. Louis 6, Mo., U.S.A.

Leo Freeman, V.P. Sugar Mill Div.
2530 Terrace Ave., Baton Rouge, La., U.S.A.

MANUFACTURERS OF SHOCK GRAIN PULVERIZERS, CANE TRASH DISINTEGRATORS, BAGASSE CLEANER AND FILTER AID, BALE BREAKERS, ELEVATING AND CONVEYING EQUIPMENT

NOW! HERE AT LAST!

Self-Lubricated SEALS

EXCLUSIVELY AT

EDWARDS
ENGINEERING CORPORATION
715 CAMP STREET • NEW ORLEANS 12, LA. • U. S. A.

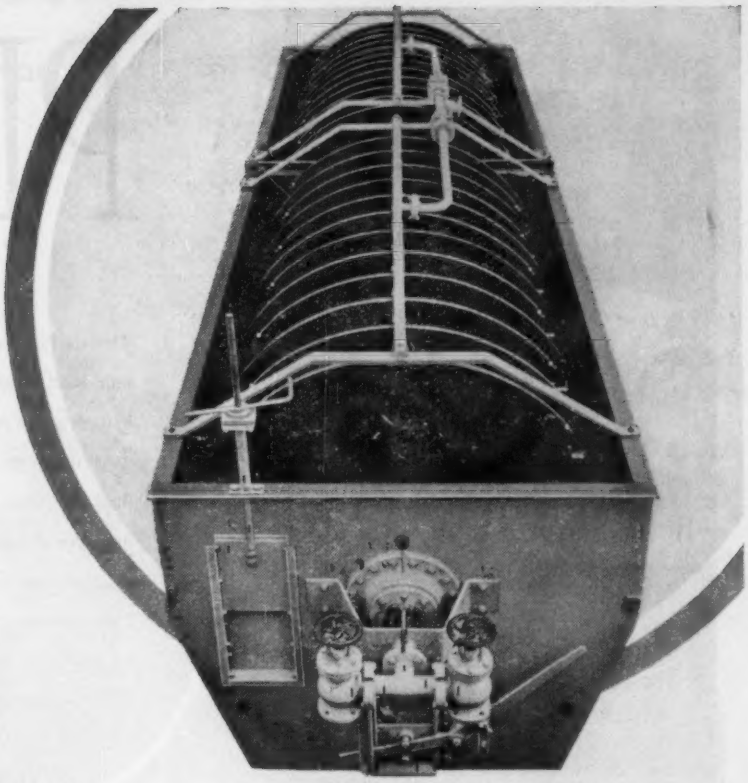
More than 500

WERKSPOOR

Rapid Crystallizers

in use in

sugar factories



Applications for high grade as well as for LOW GRADE massecuites!

Licensees for the manufacturing of Werkspoor Rapid Crystallizers:

Ansaldo - San Giorgio
Genoa - Italy

Atlantic, Gulf and Pacific Company of Manila, Inc.
Manila - Philippines

Maschinenfabrik Buckau R. Wolf A.G.
Grevenbroich - Germany

Fives Lille - Cail S.A.
Paris - France

Honolulu Iron Works Co. Inc.
Honolulu - Hawaiian Islands

Honolulu Iron Works Co. Inc.
New York - U.S.A.

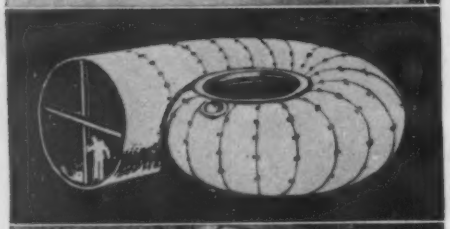
A. & W. Smith & Co. Ltd.
London - Great Britain

Succesores de Abarca Inc.
San Juan - Puerto Rico

WERKSPOOR

AMSTERDAM WORKS (Holland)

Bendiam



PIPES

Thousands upon thousands of miles of pipes—
mild steel pipes, straights, bends, branch pipes,
hydro-electric pipes, circulating water and
irrigation pipes, gas mains. Pipes for the
Blue Nile Dam and for Calder Hall,
for a power house in Mexico and a tin mining
plant in Nigeria—so the story goes on.
This is just part of the contribution
towards progress made by one of Britain's
most progressive engineering organisations.

HORSELEY GROUP

MECHANS LIMITED

SCOTSTOUN IRON WORKS
GLASGOW W4

In the course of the last 8 years, we have supplied

more than 100 BUCKAU-WOLF

forced flow evaporators

for cane and beet sugar factories.

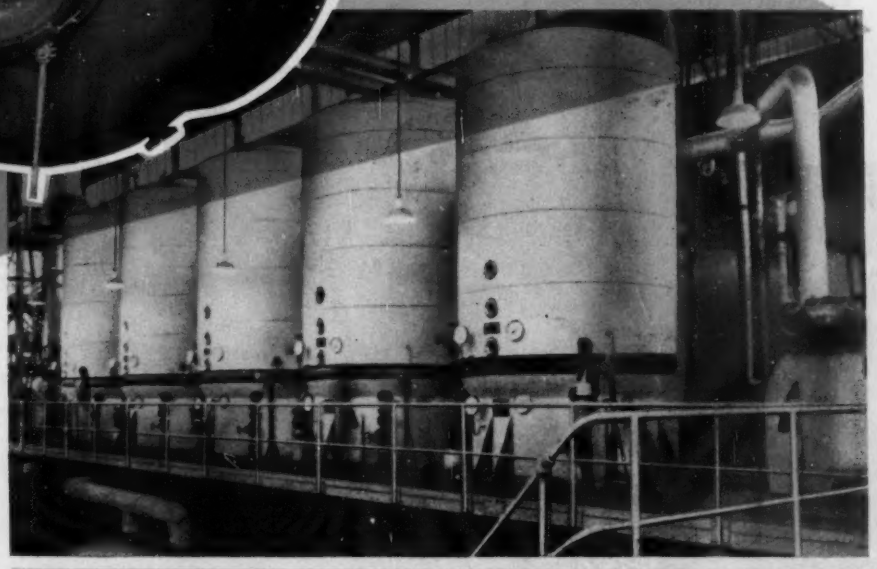
Amongst other equipments, we delivered for the sugar factory at Moerbeke-Kwilu in the Belgian Congo:

1 complete quadruple effect evaporating station

system "Buckau-Wolf"
with a heating area of 2445 m² (26310 sq. ft)

comprising:
3 apparatus, each of 515 m² (5540 sq. ft) and
2 apparatus, each of 450 m² (4845 sq. ft) heating area.

For cleaning purposes, the apparatus can be disconnected and each apparatus can be switched over to another effect. Some of the vapour slides are equipped with motor drive.



The first 3 apparatus are designed as **Buckau-Wolf forced flow evaporators** and provided with juice circulating pumps. All the evaporators are fitted with patented quick acting closing devices arranged at the lower bottom (opening and closing within some seconds)

MASCHINENFABRIK BUCKAU R. WOLF

AKTIENGESELLSCHAFT · GREVENBROICH-NEUSS

(WESTERN GERMANY)

9071 e

HUSSAR TD 12
For medium conditions, sizes 2–6 furrows convertible and adjustable for width of cut. Depth of work 9 in. (24 in. discs) or 10 in. (26 in. discs).

CONDOR TD 16 & TD 19
With 3 and 2 discs, respectively, easily reversible and easy to operate. Depth of work 10 in. (26 in. discs) 11 in. (28 in. discs).

KESTREL TD 1012
A 2-furrow reversible plough for light tractors. Lifting, lowering and reversing are hydraulically controlled. Furrow width 11 in.; depth of work 10 in.

FINE DISC PLOUGHS FOR HARD WORK

Years of experience in the production of implements for all parts of the world enables Ransomes to offer a range of superb modern disc ploughs which will give consistently good performance over many years. We shall be pleased to supply you with literature of these and also of the numerous other implements in the wide Ransomes range—share ploughs, cultivators, toolbars, disc harrows, ridgers, subsoilers, sprayers, mowers, small crawler tractors, etc.

HAWK TD 17 & TD 18
Will plough 10 in. deep in hard land and is available in 3-furrow (TD 17) and 4-furrow (TD 18) sizes both convertible and adjustable for width of furrow.

Ransomes

DISTRIBUTORS IN MOST COUNTRIES

Famous throughout the world for agricultural machinery

RANSOMES SIMS & JEFFERIES LTD., IPSWICH, ENGLAND

YORKSHIRE IMPERIAL

place at your disposal
their long, specialised experience
in the metallurgical development
and manufacture of

TUBES FOR THE SUGAR INDUSTRY

The resources of Yorkshire Imperial Metals Limited are devoted solely to the manufacture of non-ferrous tubes, plates and fittings, and plastic tubes and fittings. They have long been intimately associated with the Sugar Industry, both at home and overseas, and have made a careful study of the varied and often arduous operating conditions which obtain in the Industry. This study has resulted in the development of improved tube and plate alloys, metallurgically designed and scientifically manufactured to give the best possible service. This unrivalled experience is at your service, free of charge and without obligation, to assist in the solution of problems of all kinds affecting the life and use of non-ferrous tubes and plates.

Yorkshire Imperial craftsmanship, metallurgical skill and specialised experience, together with modern plant and methods and accurate control at every stage of manufacture, account for the enviable reputation which *Yorkshire Imperial* tubes and plates and *Yorkshire Imperial* fittings have achieved in their respective fields.

TUBES IN "YORCORON" · "KUNIFER 10" · COPPER AND "SEVA" BRASS · PLATES IN A WIDE RANGE OF ALLOYS · BI-METAL TUBES AND PLATES.

YORKSHIRE IMPERIAL METALS LIMITED

HEAD OFFICE—P.O. BOX 166, LEEDS.
TELEPHONE: LEEDS 7-2222

KINGSTON INDUSTRIAL WORKS LTD.

N. G. MARTIN
General Manager

The largest engineering works in the West Indies

Founded 1908

●

Specialists in

Manufacture and Repair of Sugar Machinery
Steel Construction
Tank Building
Pipework
Marine Repairs
Electrical Engineering

H. SUNDERLAND
Works Manager

●
●
●

Workshop Facilities

Design, Drawing and Estimating Service
Foundry
Plate Shop
Coppersmiths
Machine Shops
Fitting and Welding Department

R. HOMER
Asst. Works Manager

●

J. BRINDLEY
Design Engineer

KINGSTON INDUSTRIAL WORKS will design, fabricate and erect Steel Buildings, Tanks, install Mechanical Equipment, lay Pipework, here in Jamaica, or any place in the West Indies.

No job too large — No job too small
Let K.I.W. quote you.

D. GRANT
Machine Shop Supervisor

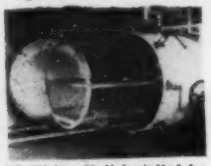
F. PEARCE
Plate and Fabrication Supervisor

KINGSTON INDUSTRIAL WORKS LTD

138 SPANISH TOWN ROAD, KINGSTON 11

Phone: 86121. *Cable:* Industrial, Jamaica, W.I.

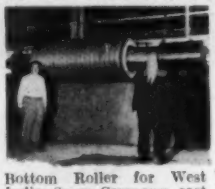
Evaporator manufactured by Kingston Industrial Works.



Sterilizing Unit installed by K.I.W. in Mandeville Public Hospital, along with oil-fired boiler and other laundry equipment.

Vacuum Pan installation manufactured by K.I.W. for Hampden Sugar Estates, Falmouth, Jamaica.

Storage tank for Jet aviation fuel, manufactured and installed by K.I.W. at Montego Bay International Airport.



Bottom Roller for West Indies Sugar Company, cast and machined by K.I.W., size 78 in. × 33 in. Finished weight 11 tons.

Cane Carrier slats manufactured by Kingston Industrial Works, and in use in sugar mills throughout the island.

Use rugged LINK-BELT

900

class chain

for intermediate cane carrier service

You cut downtime to a minimum when you specify Link-Belt 900 Class chain for intermediate carrier service.

This durable chain stands up under the most gruelling and corrosive carrier conditions. The special Link-Belt rib design gives additional link strength. Double sprockets contact outboard driving lugs . . . bagasse cannot jam in centre pockets of links with this method of driving. Result: Longer trouble free operation . . . fewer conveyor shutdowns.

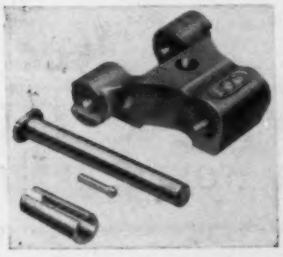
Link frames—available in malleable iron, Promal, bronze or stainless steel—can be furnished with pins and bushings of either carbon steel, bronze or stainless steel.

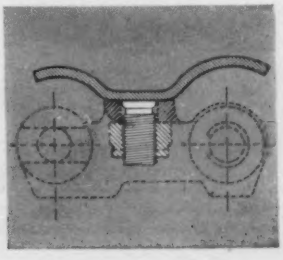
For complete information on Link-Belt chains and sprockets, contact your Link-Belt representative. Or write direct for Book 2640 containing full information on Link-Belt's complete line of sugar-handling equipment.

15,051-R

COMPONENTS are accurately made, carefully assembled. Wearing shoes at open end of link prevent tilting. Bushings are renewable, fit securely in barrel. Pins are firmly locked to prevent rotation in sidebar—cotter type assures easy assembly.

WELDED STUD SLATS eliminate slat hole elongation, prevent juice leakage and resist corrosion. Longer carrier life is assured because slats and chains are properly matched. Stainless steel self-locking nuts should be tightened with a torque wrench in assembly . . . disassembly is easy.



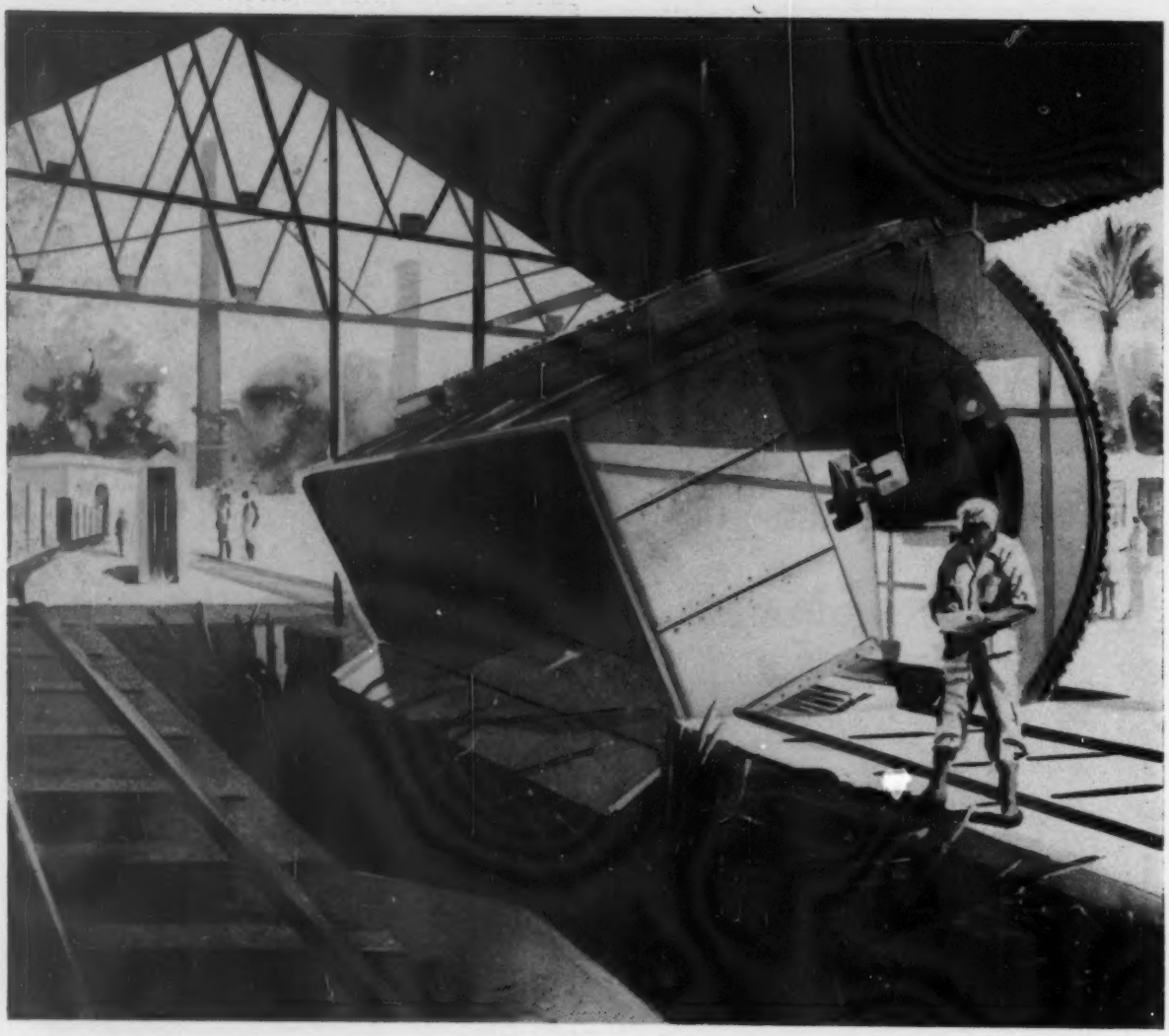


LINK-BELT

THE SYMBOL OF QUALITY · LINK-BELT ·

CHAINS • SPROCKETS • SLATS

LINK-BELT COMPANY: Engineers · Manufacturers · Exporters of Machinery for Handling Materials and Transmitting Power Established 1875. **EXPORT DIVISION**: Dept. 260-ISJ, 233 Broadway, New York 7, U.S.A., Cable Address: Linkbelt—New York · Australia, Marrickville (Sydney) · Brazil, Sao Paulo · Canada, Scarboro (Toronto) · South Africa, Springs. · Representatives Throughout the World.



The S & H

Cane Car Tippler

in India

Unloading Cane

at Nellikuppam

The Strachan & Henshaw Tippler, installed at the East India Distilleries and Sugar Factories Limited will tip, and unload 4-wheeled and bogie cane cars up to 36 tons gross in two minutes.

The cars are clamped automatically, leaving the open tops unobstructed, and the cane is emptied into a trench at the side of the track for conveyance to the crushing mills.

STRACHAN & HENSHAW LIMITED

STEELHOIST WORKS, BRISTOL 2, ENGLAND TEL. 78331

Up to 45 tons breaking load

20% more bearing area

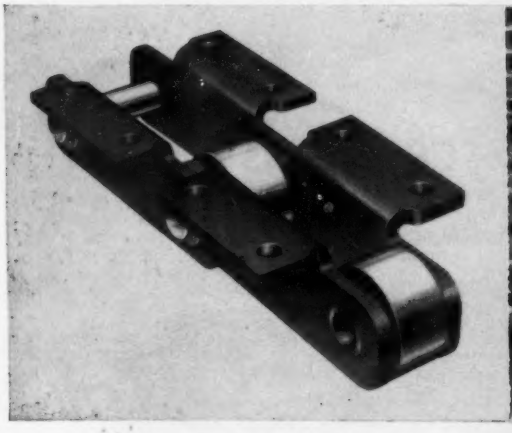
6% carbon steel heat treated rollers

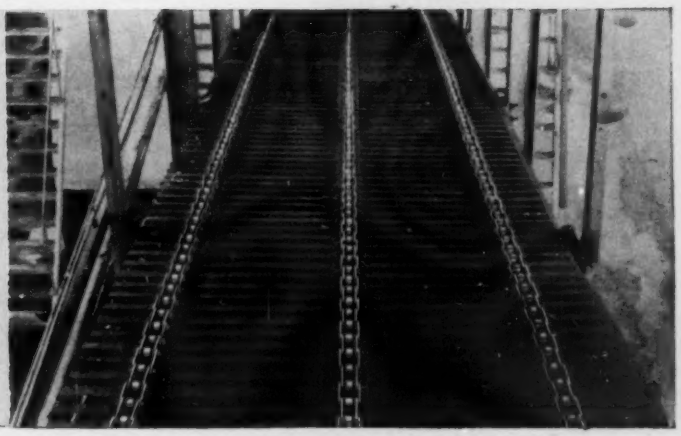
with

RENOLD

CANE CONDUCTOR, BAGASSE CARRIER, AND FEEDER TABLE

Conveyor chains





Renold "sugar" chains are designed and manufactured for heavy and arduous duties encountered in cane and bagasse handling. They are based on standard conveyor chains which have been developed over many years of experience and are recognised throughout the world as a quality product of the first order. Chains supplied to the Cuban Centrals in 1925 are still working satisfactorily after having transported millions of tons of cane.

For complete specifications of Renold steel chains for the cane sugar industry send for Leaflet Ref. 120/26

RENOLD

RENOLD CHAINS LIMITED · MANCHESTER · ENGLAND

Representation throughout the world

SCREENING

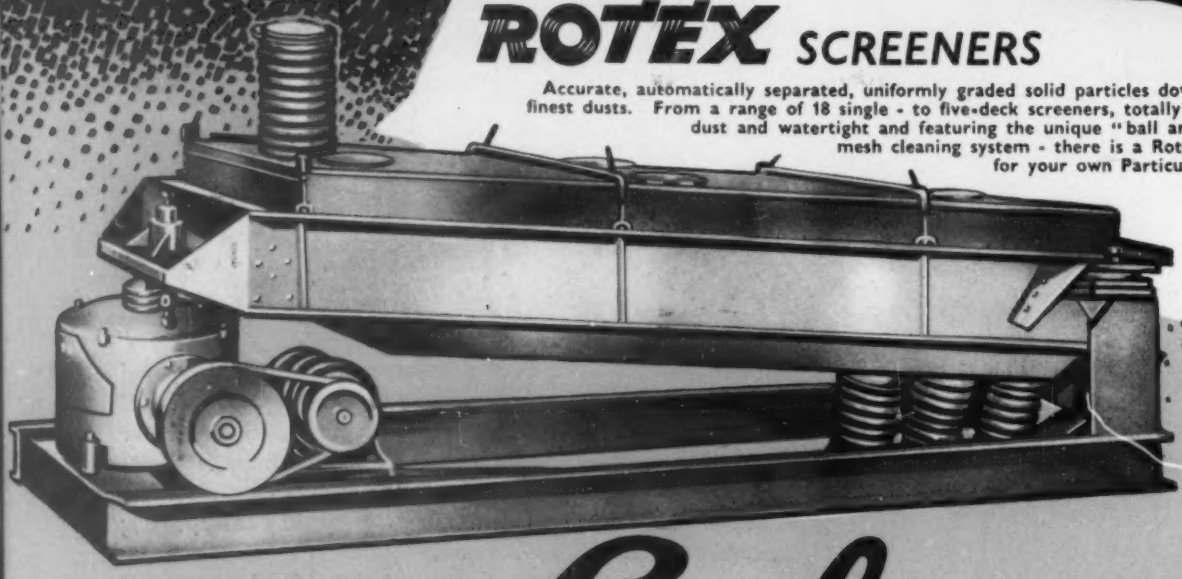
from to

ABRASIVES·ALFALFA·ALLSP
ALUM·ASPIRIN·ALUMINIUM F
ALUMINIUM SKIMMINGS·ANTI
ASBESTOS·ASH, DENSE·BAGASSE
BARK, GROUND·BARLEY, GROUND
CARDOXIDE·CASEIN·CELERON·CEME
CEREALS·CHARCO L·CHEESE, POWDE
CHOCOLATE·CHRO ORE·CINNAMON·C
COAL SEA·COCOA·C NUT MEAL·COFFEE
COFFEE, CHAFF·COK PPER, POWDERED·C
COPPER SULPHATE·C · CARBONATE·COPR
CORK·CORN·CORN, CRACKED·CORN FLOUR·COTT
COTTON SEED MEAL·CRACKER MEAL·DENTAL POW
DEXTRINE·DOG BISCUIT·DYE·EARTH·ENAMEL·FEED
FELDSPAR·FERTILIZER·FLAXSEED CAKE MEAL·FLOUR·F
FACINGS·FULLERS EARTH·GINGER·GELATIN·GLANDULA
GROUND GLASS·GLAUBERS SALT·GLUE·GRAPE NUTS·GRAV
GYPSUM·HEXTMETHY E·HOMINY·HORN, GR
ILMENITE ORE·INSECT TING MATERIAL·LIMES
LITHARGE·LITHOPONE BLUE·LEAD BARATE·LE

LEAD, WHITE·MAGNESIA, MILK OF·MAGNESIT
MAGNESIUM POWDER·MANGANESE ORE·M
MEAT SCRAPS·MICA·MILK, FLAKES·MILK P
MILK, MALTED·MILK, POWDERED·NICKEL
PIGMENTS·POWDER, SMOKELESS·NUTM
PECTIN·PEPPER·PUMICE·PYRETHREUM
PYRITES·QUARTZ, CRUSHED·REFRACT
ROCK, CRUSHED·ROS
ROUGE·RUBBER COM
RUBBER, RECLAIME
RUBBER SLUDGE·SAL
SALTS, EPSOM·SAND
SAWDUST·SCREENI
SEEDS·SILICA·SILICA
SLATE, CRUSHED·SN
SOAP POWDER·SOAP
SODA HYPOSULPHIT
SODIUM FLUORIDE·SODIUM, TRIPHOS
STARCH·STEARIC ACID·SULPHUR·TAL
TANKAGE·TAPIOCA·TARTARIC ACID·T
TITANIUM OXIDE·TOBACCO·VEGETABL
HYDRATED·WHEAT·WHITING·WOOD F
YEAST, BREWERS·ZEOLITE·Z
ZINC ORE·ZONOLI

with ROTEX SCREENERS

Accurate, automatically separated, uniformly graded solid particles down to the finest dusts. From a range of 18 single - to five-deck screeners, totally enclosed, dust and watertight and featuring the unique "ball and bevel" mesh cleaning system - there is a Rotex Screen for your own Particular needs.



For screens of all capacities for all industries

Look to Lockers OF WARRINGTON

A MEMBER OF THE JL GROUP

WRITE FOR SCREENING LEAFLET 13A which describes in detail the range of ROTEX SCREENERS

LOCKER INDUSTRIES LTD., WARRINGTON, ENGLAND. Tel. : Warrington 34111 (10 lines), Grams : "Lockers, Warrington"
London Office : CLUN HOUSE, SURREY ST., STRAND, W.C.2. Tel. : TEMple Bar 8559, Grams : Eotrand, London

I.S.J.

SUGAR BOOK DEPARTMENT

All books reviewed in this *Journal* may be obtained through our Sugar Book Department. Where no inclusive price is quoted in our review, 2s. 6d. should be added to cover the cost of packing and postage.

★ *Check your personal library against the list of basic books given below :*

		POST PAID
BASIC CALCULATIONS FOR THE CANE SUGAR FACTORY: *Eisner*	(1958)	**7s. 6d.**
PRINCIPLES OF CANE SUGAR MANUFACTURE : *Davies*	(1938)	**22s. 6d.**
CANE SUGAR AND ITS MANUFACTURE : *Geerligs* ...	(1924)	**32s. 6d.**
CANE SUGAR HANDBOOK (8th ed.) : *Spencer and Meade*	(1945)	**134s. 6d.**
SUGAR ANALYSIS (3rd ed.) : *Browne and Zerban*	(1941)	**183s. 6d.**
BEET SUGAR ECONOMICS : *Cottrell*	(1952)	**42s. 6d.**
SUGAR YEAR BOOK : *Int. Sugar Council*	(1958)	**11s. 0d.**
SUCRERIE DE BETTERAVES : *Dubourg*	(1952)	**62s. 6d.**
PRINCIPLES OF SUGAR TECHNOLOGY (Vol. I) : *Honig*	(1953)	**97s. 6d.**
(Vol. II): *Honig*	(1959)	**97s. 6d.**
TECHNOLOGY FOR SUGAR REFINERY WORKERS (3rd ed.): *Lyle*		**72s. 6d.**
LICHT'S INTERNATIONAL SUGAR ECONOMIC YEAR-BOOK & DIRECTORY	(1959-60)	**55s. 6d.**
SYSTEM OF CANE SUGAR FACTORY CONTROL (2nd ed.): *International Society of Sugar Cane Technologists*	(1956)	**13s. 9d.**
HANDBOOK OF CANE SUGAR ENGINEERING. *Hugot,* translated by *Jenkins*	(1960)	**172s. 6d**

The above prices include postage and packing.

Terms are strictly cash in advance.

Our Bankers are : Barclays Bank Ltd., 3 Great Tower Street, London, E.C.3.

SUGAR BOOK DEPARTMENT, International Sugar Journal, Ltd.

Central Chambers, The Broadway, London, W.5.

The best result

is obtained by the

AKTIESELSKABET DE DANSKE SUKKERFABRIKKER
COPENHAGEN · DENMARK

The lowest investment

The cheapest maintenance

The lowest draft and pulp losses

The smallest fuel consumption

The best pulp-pressing

IN OPERATION ALL OVER THE WORLD

International Sugar Journal

VOL. 62 *August, 1960* No. 740

Editor and Manager :
D. LEIGHTON, B.Sc., A R.I.C.

Agricultural Editor :
H. MARTIN-LEAKE, Sc.D

Assistant Editor :
M. G. COPE, A.I.L.(*Rus.*)

Panel of Referees

L. D. BAVER,
Director, Experiment Station, Hawaiian Sugar Planters' Association.

A. CARRUTHERS,
Director of Research, British Sugar Corporation Ltd.

F. M. CHAPMAN,
Technical Adviser, Tate & Lyle Ltd.

J. EISNER,
Technical Adviser, Booker Bros. McConnell & Co. Ltd.

P. HONIG,
Consulting Sugar Technologist.

J. CAMPBELL MACDONALD,
Chief Technical Officer, British Sugar Corporation L

H. C. S. DE WHALLEY,
Consultant, Tate & Lyle Ltd.

O. WIKLUND,
Swedish Sugar Corporation.

Published by:
The International Sugar Journal Ltd.
Central Chambers, The Broadway,
London, W.5.
Telephone : EALing 1535
Cable : Sugaphilos, London.

Annual Subscription : 32s 0d. or $5.00 post free
Single Copies : 2s 6d or 45 cents post free

PAGE

Notes and Comments 205
U.S.–Cuban relations and sugar. British Sugar Corporation Ltd. Annual Report 1959/60. The raw sugar market. Verenigde H.V.A.–Maatschappijen N.V. Annual Report.

* * *

Agricultural Articles :

Up-to-date Weed Control in Sugar Cane 207
By Dr. H. E. Roth.

Report of the Experiment Station, Hawaiian Sugar Planters' Association, 1959 210

New C.S.R. Cane Research Centre 212

Agricultural Abstracts 209, 211

* * *

General Articles :

Manufacture of Bakers' Yeast by Continuous Fermentation (Part I) 213
Plant and Process.
By A. J. C. Olsen, M.Sc.

British Sugar Corporation Limited 217
13th Technical Conference.

The Sugar Industry in Taiwan 219

* * *

Sugar-House Practice 221
Service life of anion exchange resin "Amberlite IRA-401" and a new application in the refinery. Studies on the utilization of the ion exchange process in sugar refining. X. An electron microscopic observation of the surface fine structure of anion exchange resin particles and its change by restoration treatments. Automatic control of the magma making process *etc.*

Beet Factory Notes 224
The use of phosphates in the sugar industry. The 2nd carbonatation time cycle. Experiments on the use of sodium phosphate to improve boiling and massecuite centrifugalling at No. 2 Petrovsk factory. The drop in crystallization rate of sucrose in green syrup at a temperature of 90°C *etc.*

New Books and Bulletins 227
Reports on the Progress of Applied Chemistry. Vol. XLIII: 1958. An Introduction to Industrial Mycology, 5th Edition. F. O. Licht's Internationales Zuckerwirtschaftliches Jahr- und Adressbuch 1959/60 *etc.*

Laboratory Methods and Chemical Reports 228
Determination of reducing sugar by use of the "redoxokinetic effect." Formation of conglomerates of sugar crystals. Photoelectric automatic polarimeters. Colour chart for the determination of whiteness value of sugar from reflectances at 450 and 560 mμ *etc.*

Patents 231
Beet harvester. Beet topper (feeler wheels). Purification of crude sugar solutions. Mechanical handling of articles such as packets of sugar and other substances. Beet thinners. Centrifugals *etc.*

Trade Notices 233
Sihi pumps. Bulk sugar carrier for Wesburn Refinery. Rotary discharge valve. Dust collector. New "Coal-Pak" boilers *etc.*

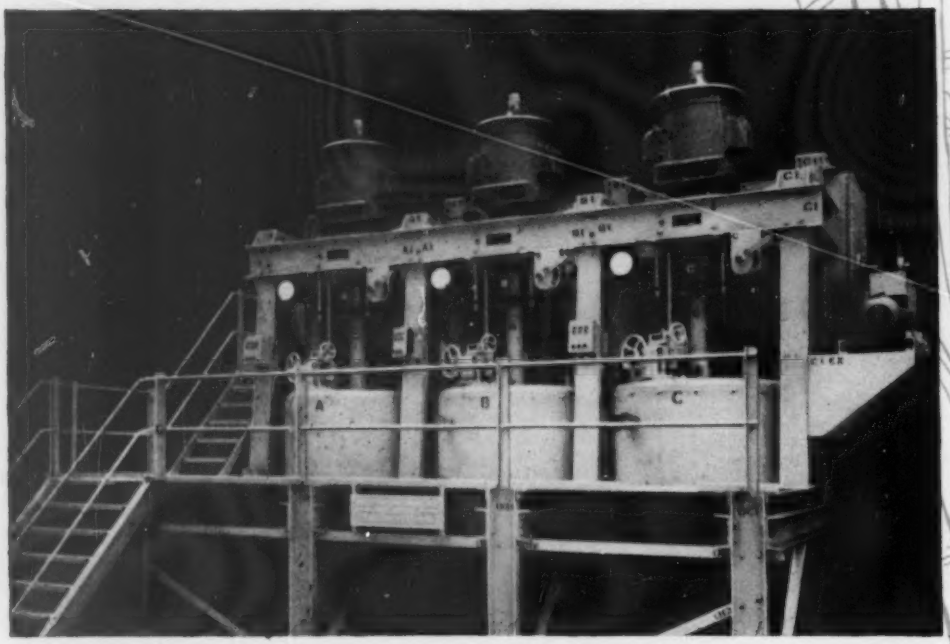
Brazil Sugar Exports 235

Stock Exchange Quotations 236

Brevities 235–6

Index to Advertisers xlvi

TOP GRADE MACHINES FOR TOP GRADE . . . SUGAR



✳ *DESIGNED FOR EFFICIENCY AND RELIABILITY*

DESIGNERS AND MANUFACTURERS
OF MODERN
CENTRIFUGAL MACHINES

There is no magic formula to replace experience but YOU can profit by OUR vast experience of the sugar industry. CENTRIFUGALS with Electric Drive; Water drive, or Belt drive. CENTRIFUGALS for all grades of sugar. CENTRIFUGALS for all sizes of factories. We design and make centrifugals which provide long, economical, trouble-free service. Ask us to send you a copy of our publication B59.

WATSON LAIDLAW
AND COMPANY LIMITED

98 LAIDLAW STREET, GLASGOW C.5.

Telephone: **SOUth 2545** *Telegrams:* **'Fugal' Glasgow**

THE
INTERNATIONAL SUGAR JOURNAL

VOL. LXII AUGUST, 1960 No. 740

NOTES AND COMMENTS

U.S.-Cuban relations and sugar.

The most important feature of the past month has been the passing of the Administration's Sugar Act legislation and the subsequent cutting of Cuba's 1960 quota by 700,000 tons, virtually the undelivered balance of her original quota. This cut, professedly a result of doubts on the stability and certainty of supplies of sugar from Cuba, is an obvious political reaction to the expropriation of the American-owned oil properties in Cuba. That American patience, sorely tried during the past 18 months, should have come to an end with these seizures, following the take-over of sugar properties at enforced bargain prices, is not surprising, but is an emotional reaction which will result, it seems, in harm to both parties concerned.

First, since the U.S.S.R. has offered to buy the 700,000 tons, Cuba will not be left with this surplus as an encumbrance, but it is unlikely that the Russian offer will carry with it a price higher than that paid for its previous purchases and, even if it were at the Cuban Sugar Institute's recently declared minimum of 3·25 cents/lb, would still result in a loss of some $30,000,000 to the Cuban economy and very much more in 1961 and later years, if the U.S. continues to seek its sugar elsewhere. The Cuban people, idolizing Dr. CASTRO, are unlikely to blame him or his ministers for the sufferings which ensue—instead, their bitterness against the U.S. and readiness to depend on the U.S.S.R. are likely to increase.

Second, the U.S., although it will not suffer financially, will have lost its prestige as leader of the free world in the eyes of the countries of Latin America which, while they will happily accept increased quotas —in some cases they will be a godsend in the reduction of burdensome stocks due to over-production —will view with cynicism the "explanations" for the cut, and the hasty announcement of fresh economic aid to Latin American countries—excluding Cuba—which will be taken, respectively, as a device to avoid a charge of "economic aggression" and a further example of American concern with their welfare only where U.S. interests are threatened (as after Mr. NIXON was stoned in Venezuela two years ago). Thus the American decision has placed her in a perfect position for denunciation by Communists as the big bully, dominated by business interests, while also permitting—even encouraging—the growth of Communist influence in the Western Hemisphere by giving it a toe-hold in Cuba. This result is one which is likely to be more costly to the U.S. than the loss of all the investments in Cuba put together.

Finally, since sugar production in the countries supplying sugar to the U.S. is likely to expand, the supplies to the free market are probably going to be reduced less than the available sugar from Cuba. Even with a statistical balance, prices are low; with excess supplies the market is liable to be very depressed in the future.

* * *

British Sugar Corporation Ltd. Annual Report 1959/60.

In 1959/60, with a yield of 5,509,769 tons, the beet crop came second only to the record of 1958/59 (5,742,328 tons). The highest average yield of beet per acre yet reached was obtained by the growers for the Spalding factory, with 19·32 tons of beet (equivalent to 66·06 cwt sugar) per acre. Record yields were also obtained in eight of the other factory areas. The sugar content of the beet was exceptionally high, particularly in the early part of the season, and the campaign average of 16·9% was the highest since 1947/48. The yield of sugar per acre for all areas reached a figure of 45·3 cwt, the highest so far achieved.

Sugar production figures were the highest yet achieved. 477,049 tons of refined and 312,924 tons of raw were produced, equivalent to a total output in terms of white sugar of 773,292 tons. Dried pulp production in all forms came to 420,822 tons and molasses production amounted to 281,112 tons.

At the beginning of the campaign, with the long drought still unbroken, the average sugar content of beet was nearly 19% and some loads had sugar contents as high as 25%. Slicing was therefore restricted by the rate at which sugar could be processed in the later stages on manufacture. With the coming of rain, however, and the subsequent fall in sugar content, the slicing rate greatly increased. The average slicing capacity reached a new level of

49,007 tons per day, being nearly 1400 tons per day higher than the previous record of last year.

The degree of sugar extraction from the beet is an important aspect of technical efficiency. Overall sugar extraction in terms of white sugar and molasses had increased from 93% in 1948 to 96·5%; in this last campaign the figure was improved still further to 96·75%.

The cost of refined sugar delivered from the 1959/60 sugar beet crop before taking account of duty and preference and surcharge was 58s 3¼d per cwt (last year 57s 4¼d).

The comparable cost of raw sugar of 97·5° pol from the same crop but again before taking account of duty and preference and surcharge was 50s 1¼d per cwt (last year 50s 10d) on a delivered basis.

The improvement in extraction last year was made possible by the introduction of new diffusion plants at Bury St. Edmunds, Ely, and Kidderminster and of new filtration plants at the Brigg and Ipswich factories. In addition to these major installations, a new power plant was installed at Kidderminster, new evaporator plant at Bardney, and vacuum pans at Brigg. Improvements in beet reception facilities were made at Bardney and Colwick.

In the field of fuel economy, coal consumption in the boiler houses has been reduced still further. Based on last campaign this amounted to a saving of 6000 tons of coal over the previous year.

The automation of the factory process continues and with the installation of the extraction and filtration plants referred to, has contributed to a reduction since last year of four man-minutes per ton of beet worked. At several factories the operation of all the extraction, purification and concentration plant to the thick juice stage is controlled by such means.

Notwithstanding this very high outturn of sugar and increased operating efficiency the continuing low world sugar price received for the Corporation's product resulted in a deficiency on Revenue Account which has been reimbursed by the Sugar Board in accordance with the provisions of the 1956 Act[1]. The efficient performance of the factories gave a new high throughput of beet, and combined with further economies in the use of labour, fuel and materials, produced earnings from the incentive agreement of £2,382,988 compared with £1,863,436 in 1959. After providing for taxation on this income and benefits to employees in accordance with the provisions of the Sugar Act 1956, an amount of £1,000,000 has been appropriated from these profits and added to the revenue reserve for future re-equipment of the factories.

* * *

The raw sugar market.

The price of raw sugar has been low in past months, which has been blamed to some extent on the apparent determination of the Cuban Sugar Institute to sell all the sugar it could without regard to the world quota. The transfer of 400,000 Spanish tons from the voluntary reserve to the ICEA world quota raised it to a tonnage which was slightly higher than its total sales and cover given to refiners. No compensating reduction was made, however, in the producers' free world quota, so that the combined world quotas exceeded that under the International Sugar Agreement. This indicated a sales policy which was not governed by quota limitations and tended to weaken the market. However, the announcement at the end of June that no sales would be made by the Institute under 3 cents/lb coupled with an offer to buy up to 450,000 tons at 2·95 cents strengthened the market as did the announcement of a new minimum price of $3·25 on the 7th July.

* * *

Verenigde H.V.A.-Maatschappijen N.V. Annual Report.

Indonesia.—In the course of the year under review the estates in Indonesia of N.V. Handelsvereeniging "Amsterdam" were nationalized, retrospectively to December 3rd 1957. As already stated in the 1958 report of N.V. Handelsvereeniging "Amsterdam", the legitimacy of this nationalization is not recognized, so that in this respect the Company holds the Indonesian Government fully liable for all loss and damage suffered and still to be suffered.

Ethiopia.—The expectation, expressed in the 1958 report, that the production of Wonji sugar estate would rise to about 34,000 tons, was amply exceeded. Production was 35,858 tons compared with 32,504 tons in 1957/58 and was sufficient to satisfy the Ethiopian home demand.

It is expected that the sugar production in the 1959/60 campaign will amount to about 40,000 tons. With this, the output of the Wonji sugar factory will have reached a level above which no further notable increase is to be expected.

The erection of the second sugar factory, called "Shoa", is now in full swing. The orders for the factory building and the installations have already been placed. Barring unforeseen circumstances, Shoa will be put into operation at the end of October 1962, on the basis of a capacity of about 25,000 tons of sugar. Since the factory building has been planned for a final capacity of about 40,000 tons of sugar, gradual expansion of the installation up to the latter capacity will be simple.

Preparatory measures are being implemented in connexion with the necessary extension of planting. Some extension of the now available planting area is necessary for the calculated final capacity of the Shoa factory.

Turkey sugar production[2].—White sugar production in 1959 was 499,747 tons, compared with 365,000 tons in 1958 and 137,429 tons in 1950. The sugar beet crop was about 3,460,000 tons compared with 2,324,000 tons in 1958 and 855,066 tons in 1950. Sugar exports in the past year are assessed at 106,445 tons; it is hoped to raise this to 200,000 tons this year.

[1] See *I.S.J.*, 1960, **62**, 177.
[2] *Zeitsch. Zuckerind.*, 1960, **85**, 258.

UP-TO-DATE WEED CONTROL IN SUGAR CANE

By Dr. H. E. ROTH
(J. R. Geigy, S.A., Basle)

THE sugar cane industry has undergone impressive development in tropical and subtropical countries all over the world within the last few decades. Taking advantage of modern growing methods, improved irrigation and cultivation techniques, mechanization and new methods of weed, pest and disease control has enabled it to achieve a high standard and to improve considerably the yield of cane per acre as well as sugar production per surface unit.

Fig. 1. Plant cane in Puerto Rico six weeks after treatment with 2 lb active "Sumazine" per acre in 4 gal water, distributed from the air.

Weeds are still one of the planter's main problems; if they are not kept continuously under control they can rapidly invade large areas of cultivated land and take a heavy toll of the yield. Weeds absorb water and soil nutrients and compete for living space with the crop; if they are left uncontrolled this battle is almost always decided in favour of the weeds. In addition weeds often harbour pests and diseases, thus increasing the adverse effect on the yield.

Until fairly recently weed control in sugar cane was traditionally carried out by contracting piecework labour. Since in most sugar cane growing countries cheap labour was available in abundance due to large population and lack of industries, the practice of handweeding was both feasible and economic. The days of cheap labour, however, have gone or are a least fading away quickly. The rise in the standard of living of the people is linked with the rise of wages and thus reduces gradually the availability of cheap labour. In estates close to urban areas there is often a serious shortage of labour during the planting season and at times when weed control is most urgently needed.

Weed control by hand hoeing—although in certain areas still the most common method—has considerable drawbacks in so far as the extensive soil disturbance creates an almost ideal situation for the germination of fresh weed seeds; weed control must therefore be continuous throughout the greater part of the season. Mechanical cultivation raises the same problem which is aggravated by the fact that the constant movement of men or machines over the soil surface may seriously damage young cane plants and reduce the yield. Mechanical cultivation is not dependable since field operations during the planting season are frequently interrupted by rains which make the fields impassable to heavy equipment; furthermore weeds within the crop rows cannot be eradicated by mechanical means and remain to thrive at the expense of the cane.

It is not surprising that scientists have for a long time carried on a search for better means of weed control. Chemicals were first used in the early 1940's following the discovery of the hormone weedkillers such as 2,4-D (2,4-dichlorophenoxyacetic acid). They have opened a new era for weed control and revolutionized farm practices in many crops including sugar cane.

Although hormone weedkillers allowed a rationalization of work and succeeded in replacing handweeding to an increasing extent, they showed certain limitations in so far as they do not control grass weeds and this general lack of persistence calls for repeated treatments. Although a great advance, hormone weedkillers were not the final answer to the problem and work continued on the search for new groups of chemicals.

A very important step forward in weed control has been the discovery of highly insoluble chemicals which are capable of giving residual weed control of both broad-leaved and grass weeds for much more extended periods of time than was the case with earlier chemicals. This enabled an entirely new concept, that of persistent preventive weed control, to be achieved.

A new group of chemicals exhibiting this desirable long residual action are the triazine herbicides which include "Simazine" (2-chloro-4,6-bis-ethylamino-*sym*-triazine).

The main characteristic of "Simazine" is its low water solubility (5 parts per million) which gives the chemical its specific persistence. It is only very

slightly leached by irrigation water or heavy rainfall and thus tends to remain in the upper layers of the soil for a relatively long period. One treatment therefore will give satisfactory weed control until the plants close in and lack of air, light and space eliminates weed competition. Another important characteristic of "Simazine" is its effect on broad leaved (dicotyledonous) as well as grass (monocotyledonous) weeds.

The mode of action of "Simazine" is principally by root up-take. When entering the root system of weeds "Simazine" kills by disrupting the no mal physiological processes, mainly by interfering with photosynthesis. The chemical does not prevent the germination of weed seeds, but kills the seedlings shortly after germination has taken place.

"Simazine," therefore, appeared to be an ideal chemical for use in sugar cane. An extensive trial programme was established and during the last few years the product has been thoroughly tested in almost all of the main sugar cane growing areas of the world, including the West Indies, the United States and Puerto Rico, Mexico, Peru, Venezuela, Brazil, Argentine and British Guiana as well as in Formosa and the Philippines. Within the space of this article it would be impossible to go into great detail and only some highlights of the general performance can be given.

Wherever selective weed control is practised there must be a wide margin of safety for the crop; such safety is a remarkable feature of "Simazine." Sugar cane can tolerate relatively high dosages, up to 10 lb "Simazine" (active ingredient), without any phytotoxic symptoms.

Pot studies were carried out in Hawaii by mixing "Simazine" with soil (6 in soil depth) at rates of 2½, 5, 10 and 20 p.p.m., which corresponds to a surface treatment of 3½, 7, 14 and 28 pounds active ingredient per acre. "Simazine" was safe up to 10 p.p.m. and gave only slight stunting at 20 p.p.m.

In another test "Simazine" was applied (a) over germinating setts before furrow closing, (b) as a pre-emergence spray over the closed furrow and (c) over the young emerged cane. Dosages were 4 and 8 lb (active ingredient) per acre and no damage to the plants was observed in any of these treatments.

This spectacular evidence of "Simazine" safety is explained by the fact that the chemical, after being taken up by the roots, is broken down in the cane plant into harmless products. This has been proved by the use of "Simazine" containing radio-active carbon. Practically all the tests carried out in different countries have so far produced the same results—that dosages of 1½–4 lb "Simazine" (active ingredient) per acre are sufficient for persistent control of weed seedlings, at the same time allowing a wide margin of safety between the effective dosage rate and that which might damage the crop.

"Simazine" has a very wide range of effectiveness, especially in the control of annual weeds. Where perennial weeds are the problem, results depend on the depth of the root system; in other words, if the lethal dose of "Simazine" cannot reach the roots properly, good results will not be achieved. This, however, depends on the species present and on climatic conditions, soil type, time of treatment, etc. Nutgrass (*Cyperus rotundus*), for example, has proved to be resistant to "Simazine" treatment and Bermuda grass (*Cynodon dactylon*) when well established is difficult to eliminate. On the other hand, couch grass (*Agropyron repens*), a stubborn perennial weed, can be completely eradicated by applying the higher dosages of "Simazine," while fireweed (*Erechitites hieracifolia L. Rat*, Syn: *Senecio miracifolia*), an important weed in Hawaiian sugar cane plantations, responds well to "Simazine" application. In South American countries, yard grass (*Eleusine indica*) was successfully controlled by the use of "Simazine."

Fig. 2. Eleven weeks after "Simazine" treatment.

Extensive field trials have shown that the best time for application of "Simazine" in new plantations of sugar cane is after rain or irrigation, within 8–10 days after planting. In any case treatment should be carried out before weeds emerge. The weed-free ground should be left undisturbed after treatment for as long as possible. In the case of ratoon canes—i.e. in established plantations—"Simazine" is best applied immediately after harvesting and cleaning up, preferably after irrigation or rain and in any case before new weeds emerge. Even application is essential and trash should therefore be removed as treatment should be made on clean ground.

"Simazine," being a chemical of low water solubility, is dependent on moisture conditions in the soil. Consequently the rains following "Simazine" treatment are most beneficial for activating the product in the soil. "Simazine" is of low mammalian toxicity and thus no special precautions are needed when spraying.

"Simazine" can be applied by any type of equipment, such as knapsack or motor sprayer according to normal local practice. Aerial appli-

Simazine

A new departure in weed control

One single pre-emergent application keeps young cane weed-free for months

persistent selective safe

Simazine products for weed control in sugar cane are available

in the USA and Puerto Rico through the distributors of Geigy Agricultural Chemicals, Ardsley, N.Y., as	**Geigy Simazine 80 W**
in Central and South America, Cuba, Haiti, the Dominican Republic, South Africa, the Philippines and Taiwan through the local distributors of J. R. Geigy S.A., Basle (Switzerland), as	**Gesatop**
in the British Commonwealth (other than Australia) through Fisons Chemicals (Export) Ltd., 95 Wigmore Street, London, W1, as	**Simazine 50 W**

slightly leached by irrigation water or heavy rainfall and thus tends to remain in the upper layers of the soil for a relatively long period. One treatment therefore will give satisfactory weed control until the plants close in and lack of air, light and space eliminates weed competition. Another important characteristic of "Simazine" is its effect on broad leaved (dicotyledonous) as well as grass (monocotyledonous) weeds.

The mode of action of "Simazine" is principally by root up-take. When entering the root system of weeds "Simazine" kills by disrupting the no mal physiological processes, mainly by interfering with photosynthesis. The chemical does not prevent the germination of weed seeds, but kills the seedlings shortly after germination has taken place.

"Simazine," therefore, appeared to be an ideal chemical for use in sugar cane. An extensive trial programme was established and during the last few years the product has been thoroughly tested in almost all of the main sugar cane growing areas of the world, including the West Indies, the United States and Puerto Rico, Mexico, Peru, Venezuela, Brazil, Argentine and British Guiana as well as in Formosa and the Philippines. Within the space of this article it would be impossible to go into great detail and only some highlights of the general performance can be given.

Wherever selective weed control is practised there must be a wide margin of safety for the crop; such safety is a remarkable feature of "Simazine." Sugar cane can tolerate relatively high dosages, up to 10 lb "Simazine" (active ingredient), without any phytotoxic symptoms.

Pot studies were carried out in Hawaii by mixing "Simazine" with soil (6 in soil depth) at rates of 2½, 5, 10 and 20 p.p.m., which corresponds to a surface treatment of 3½, 7, 14 and 28 pounds active ingredient per acre. "Simazine" was safe up to 10 p.p.m. and gave only slight stunting at 20 p.p.m.

In another test "Simazine" was applied (a) over germinating setts before furrow closing, (b) as a pre-emergence spray over the closed furrow and (c) over the young emerged cane. Dosages were 4 and 8 lb (active ingredient) per acre and no damage to the plants was observed in any of these treatments.

This spectacular evidence of "Simazine" safety is explained by the fact that the chemical, after being taken up by the roots, is broken down in the cane plant into harmless products. This has been proved by the use of "Simazine" containing radio-active carbon. Practically all the tests carried out in different countries have so far produced the same results—that dosages of 1½–4 lb "Simazine" (active ingredient) per acre are sufficient for persistent control of weed seedlings, at the same time allowing a wide margin of safety between the effective dosage rate and that which might damage the crop.

"Simazine" has a very wide range of effectiveness, especially in the control of annual weeds. Where perennial weeds are the problem, results depend on the depth of the root system; in other words, if the lethal dose of "Simazine" cannot reach the roots properly, good results will not be achieved. This, however, depends on the species present and on climatic conditions, soil type, time of treatment, etc. Nutgrass (*Cyperus rotundus*), for example, has proved to be resistant to "Simazine" treatment and Bermuda grass (*Cynodon dactylon*) when well established is difficult to eliminate. On the other hand, couch grass (*Agropyron repens*), a stubborn perennial weed, can be completely eradicated by applying the higher dosages of "Simazine," while fireweed (*Erechitites hieracifolia L. Rat*, Syn: *Senecio miracifolia*), an important weed in Hawaiian sugar cane plantations, responds well to "Simazine" application. In South American countries, yard grass (*Eleusine indica*) was successfully controlled by the use of "Simazine."

Fig. 2. Eleven weeks after "Simazine" treatment.

Extensive field trials have shown that the best time for application of "Simazine" in new plantations of sugar cane is after rain or irrigation, within 8–10 days after planting. In any case treatment should be carried out before weeds emerge. The weed-free ground should be left undisturbed after treatment for as long as possible. In the case of ratoon canes—i.e. in established plantations—"Simazine" is best applied immediately after harvesting and cleaning up, preferably after irrigation or rain and in any case before new weeds emerge. Even application is essential and trash should therefore be removed as treatment should be made on clean ground.

"Simazine," being a chemical of low water solubility, is dependent on moisture conditions in the soil. Consequently the rains following "Simazine" treatment are most beneficial for activating the product in the soil. "Simazine" is of low mammalian toxicity and thus no special precautions are needed when spraying.

"Simazine" can be applied by any type of equipment, such as knapsack or motor sprayer according to normal local practice. Aerial appli-

Simazine

A new departure in weed control

One single pre-emergent application keeps young cane weed-free for months

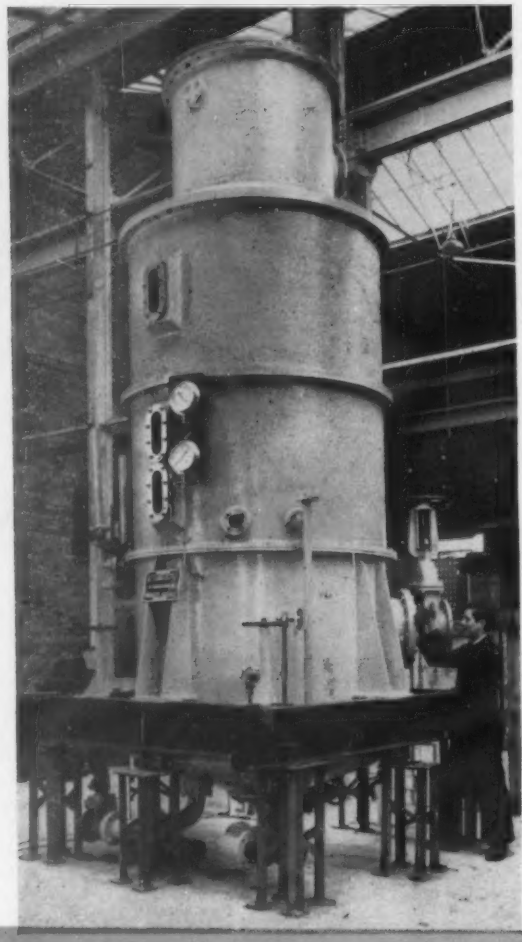
persistent selective safe

Simazine products for weed control in sugar cane are available

in the USA and Puerto Rico through the distributors of Geigy Agricultural Chemicals, Ardsley, N.Y., as **Geigy Simazine 80 W**

in Central and South America, Cuba, Haiti, the Dominican Republic, South Africa, the Philippines and Taiwan through the local distributors of J. R. Geigy S.A., Basle (Switzerland), as **Gesatop**

in the British Commonwealth (other than Australia) through Fisons Chemicals (Export) Ltd., 95 Wigmore Street, London, W1, as **Simazine 50 W**



Evaporators by

*CRAIG

* manufacturers of machinery for Complete Sugar Factories

This illustration shows a sugar factory in India. The complete mechanical equipment for this factory was supplied by Craig.

Your enquiries will have our prompt attention.

A. F. CRAIG & COMPANY LIMITED

Head Office and Works: Caledonia Engineering Works, PAISLEY, SCOTLAND
Telephone: Paisley 2191 Telegrams: Craig, Paisley

London Office: 727 Salisbury House, London Wall, E.C.2 Telephone: National 3964

cation is also possible and will be developed in some territories.

There has been great scientific interest in the mode of action of "Simazine" even before its full practical value was established. Cane plants containing "Simazine" labelled with radic-active carbon were subjected to thorough investigation. As a result of this research work it can now be taken for granted that the chemical is completely metabolized in sugar cane. Full evidence of this is provided by the attitude of the Pesticide Regulation Branch of the United States Department of Agriculture which has cleared "Simazine" for use in sugar cane on a "no residue" basis and has approved the application of "Simazine" at dosage rates of 2–4 lb (active ingredient) per acre immediately following planting or following harvest in ratoon crops.

The sugar cane planter can make the most successful use of this new chemical if he endeavours to fit it into the local cultivation practices which, of course, vary greatly throughout the sugar cane planting countries. Time of application, agricultural technique, irrigation or rainfall, cultivation practices after treatment, weed flora and density of weeds for a given area, as well as the long-term economics, are important factors which need close examination. A convenient combination of these factors will, however, secure a maximum benefit from this new method of persistent preventive weed control. The transition from the use of chemicals requiring two to four applications to relatively insoluble weedkillers such as "Simazine" which requires only a single application is a great step forward; higher yields for less work mean greater profits and prosperity for the industry.

"Simazine" is undoubtedly a most welcome weapon in the struggle between man and nature and represents another landmark in the steady scientific and technical progress of the sugar cane industry.

NOTE

The above article is open to criticism on the grounds that the approach considers only a single aspect of the very complex plant-environment interrelation. Weeds may, it is true, be a pest but that is not universally so; weeds of limited growth may protect the soil from excessive evaporation and erosion and so benefit the crop.

There is a further criticism arising from this unilateral approach. Soil fertility is a product of complex chemical and biological reactions, not the least of which is the latter. The effect of such strong chemicals, whose persistence in the soil for long periods is claimed as an advantage, is noted; yet their effect on the activities of the organisms of the soil is not considered—in fact, it is recommended that trash, which could supply the essential organic matter for vigorous microbial activity in the soil, should be removed.

If, as stated, the particular substance under discussion is capable of providing slight stunting of cane at 20 p.p.m., it is surely desirable to ascertain its effect on the soil fauna and flora, which may be more sensitive, before embarking on extended use.

The position may be summed up in the statement that maintenance of soil fertility is a long-term problem and that the real value of these methods of chemical control both of weeds and pests—valuable though they may be when used in moderation—cannot be judged on a short-term basis. There is an unfortunate, and growing, tendency to demand universal application of such substances until such time as their harmfulness receives definite proof, whereas the onus of proof that they are harmless in their long-term effects should lie with those who recommend their use.

H. M.-L.

AGRICULTURAL ABSTRACTS

The soil and its fertility. T. G. CLEASBY. *The Condenser* (Tongaat Sugar Co.), 1959, **4**, (2), 35–41.—Following a general account of what constitutes soil fertility, the results of certain experiments on the use of molasses as fertilizer are reported. The possibility of using filter cake is also under investigation.

* * *

The sugar cane mosaic position in Louisiana in 1959. R. J. STEIB and I. L. FORBES. *Sugar Bull.* (La.), 1960, **38**, 97–102.—Surveys, reported in some detail, indicate that mosaic infection is increasing in CP 44–101 and, especially, N:Co 310. In certain parishes it is likely to spread faster than new resistant varieties become available; in consequence, control measures are desirable.

Spread of mosaic in leading sugar cane varieties in 1959. I. L. FORBES and R. J. STEIB. *Sugar Bull.* (La.), 1960, **38**, 110–113.—The paper covers much the same ground as the above but includes CP 52–68.

* * *

New implements and machines discussed. G. S. BARTLETT. *S. African Sugar J.*, 1959, **43**, 1057–1061.—The article is the first of a monthly series to appear from the pen of the author who is Industrial Field Mechanization Officer of the S. African Sugar Association. It covers a wide range of implements including weeders, a high-clearance tractor and a forage harvester which is capable of handling trash and cutting it up before ploughing in.

REPORT OF THE EXPERIMENT STATION, HAWAIIAN SUGAR PLANTERS' ASSOCIATION, 1959

OF the 75 pages of this heavily and well-illustrated Report, all but five, devoted to the factory and its by-products, are concerned with the many agricultural aspects of sugar production. The field is so vast and the experimental ground covered, including experiments as yet incomplete, so extensive that it seems desirable to offer in advance to the Director an apology for any shortcomings and omissions in a necessarily brief review.

Further crop logging studies have added refinement to the critical sheath and 8–10 joint figures; interpreted in terms of lb per acre-foot the limits of probable and improbable response (doubtful being intermediate) are given as: P (Truog) <25 and >45, K (exchangeable) <200 and >300, Ca (exchangeable) <300 and >400. Mg even as low as 50 lb appears adequate. The optimum N level is placed at between 200 and 400 lb. Some interesting data are presented relating P metabolism to climate. Radioactive isotopes of several elements have been used for many studies including the rate and mechanism of photosynthesis, absorption of P as affected by root temperature and the translocation of K, Ca and P. One of the interesting conclusions is that, at present high cost, replanting does not pay, for the replants are too stunted by the boom growth.

Irrigation

A very considerable amount of fundamental work has been done on evapotranspiration, the data including pan evaporation, radiation, temperature, humidity and wind. Calibration of the recording instruments has been a source of trouble. A grid of Bouyoucos blocks extending at 1 ft interval from bank to bank and at 6 in interval to a depth of 30 in measures irrigation effects. The whole experiment, designed to check the environmental factors controlling water consumption by cane, is still in its early stages. Other experiments are concerned with the effect of boom speed in overhead irrigation, slope on water and infiltration and type of sprinkler. Many other subjects concerning surface irrigation, such as lay-out, levelling and fertilization in irrigation water are touched upon.

Mechanization

Hawaii has long been noted for the wide range and ingenuity of its probings into mechanical adaptations to meet the high cost of labour. The present report is no exception. A seed cane harvester with a higher tolerance of lodged cane is described in some detail as are the principles of other harvesters on process of design and trial. The possibility of a two-way planter capable of planting on unirrigated land up to the field edge at both ends of the line is being explored and it offers possibilities, too, in irrigated fields. The 'liliko' pick-up[1], as originally designed, has been abandoned owing to blocking by stones and stools, and a new approach to the problem is under investigation. Other subjects under investigation are protective coverings against corrosion for field equipment, pumps for fertilizer injection, a hydraulic remote-reading scale for use with grab-harvested experimental cane and a harvested cane core sampler which removes from a load of cane a core of canes 6 m long $\times$ 10 in in diameter.

Tillage

Fundamental studies concerned mainly soil compaction, particularly with reference to burial of organic matter. On humic latosols deep tillage and phosphate placement had no effect, root development being uniformly good. Cylinders of cane fibre or trash compacted with soil to 95 lb per cubic ft were not penetrated by roots nor was the organic matter materially altered after several years. However, on such permeable soils, pockets of organic matter buried by the mouldboard plough decompose fairly rapidly and cause no trouble. Generally, compaction is not troublesome on these soils but may occur with the use of the disc harrow after prolonged winter rains.

Weed Control

The formulations of chemical herbicides are now so numerous that even to list those which have received trial is impossible; the same is the case with emulsifying and wetting agents. Damage to cane from CMU and DCMU on low humic latosols appears to be increased at a pH >7 or with low organic content, the damage being greatest in the case of the latter chemical. Considerable differences in varietal tolerance to these two herbicides are also recorded.

Varieties

Figures do not justify the common belief that while yield of cane and sugar per acre have increased in the past 20–25 years, juice quality has deteriorated. One important cause for the present position is undoubtedly varietal changes, and it is held that there is still considerable scope for improvement as the result of breeding. The complex breeding programme, leading up to 297 replicated variety tests is briefly reviewed. Other work is concerned with the control of flowering. Inhibition was best effected by CMU sprayed late, in the second week of September. Induction of flowering in 37-1933 has been effected by marcotting younger shoots in the autumn and, when well established, subjecting them to 8 hours daylight for 38 days plus $4\frac{1}{2}$ hours' exposure to light of varying intensity of which 1 fc of mixed light proved most effective, giving an average visible emergence in 90 days with an initiation average of 45·4%. The procedure has enabled the making of crosses never before effected in Hawaii.

[1] *I.S.J.*, 1958, **60**, 120.

Disease

Resistance to Fiji disease and downy mildew of a number of Hawaiian seedlings has now been tested in Fiji and 28 further varieties have been despatched for test. A general picture of the disease position is given together with the control measures. Sucessful control over *Pythium* root rot in flats has been obtained with Bayer 22555 (*p*-dimethylaminobenzenediazo sodium sulphonate) which also appears to have a selective nematicidal effect, especially against *Trichodorus sp.* Trials with species of 4 genera of nematodes both apart and in association with *Pythium graminicolum* and *Fusarium oxysporum* gave no clear-cut results of any interaction.

Insects

The borer, *Rhabdoscelus obscurus*, maintains its population level and is likely to continue to do so as long cropping is practised unless parasites supplementary to *Microceromasia sphenophori* are found and introduced. *Anomala orientalis* continues to be held in check by *Campsomeris marginella modesta*. Of other pests sporadic outbreaks only are noted.

The campaign against rats is intensified. Beside the established system with standard baits, including anticoagulants, "Endrin" biscuits offer considerable promise for use in tall cane or in more inaccessible country.

H. M.-L.

AGRICULTURAL ABSTRACTS

Roguing mosaic-infected stools with a chemically fortified petroleum solvent. E. R. STAMPER and L. ANZALONE. *Sugar Bull.* (La.), 1960, **38**, 127–128.—The spread of mosaic in Louisiana makes normal methods of roguing expensive. An account is given of preliminary field trials treating individual stools. In those conducted in 1959 "Garlon" (4 lb "Dalapon" and 0·5 lb "Silvex" per gallon both in ester form) and "Fenac" (ester of 2,3,6,trichlorophenylacetic acid, 1·5 lb per gallon) were used as fortifiers and applied to the individual stools with a compressed air sprayer. Application at 4 gallons oil to 1 gallon "Garlon" should be made early when the stool is most readily killed.

* * *

A statistical investigation for forecasting recovery % cane in Eastern U.P. region. S. C. SEN and D. R. HANDA. *Indian Sugar*, 1959, **9**, 507–519, 538–545.—Further regression equations and ready reckoners are given in continuation of the series for the various Indian cane regions[1]. The basic data are derived from 18 factories for the six years 1950–51 to 1955–56.

* * *

A study of the leaf mid-rib structure of sugar cane as related with resistance to the top borer (*Scirpophaga nivella* F.). H. CHANG and C. Y. SHIH. *Taiwan Sugar*, 1959, **6**, (8), 18–22.—Considerable varietal differences were found in the thickness of the epidermis of the mid-rib, particularly the lower epidermis, and very high positive correlations have been found between these and the extent of borer damage.

* * *

Weed control with chemical herbicides on sugar cane fields in Taiwan. NUO-PAO CHOW. *Taiwan Sugar*, 1959, **6**, (9), 13–20.—After trial with several herbicides, 2,4-D has been adopted as best combining effectiveness with economy; a seasonal programme is given which includes mechanical cultivation.

Progress report on the study of the mode of resistance of genus *Saccharum* and its relatives to downy mildew. T. L. CHU *et al. Taiwan Sugar*, 1959, **6**, (12), 26–31.—The results of a 2-year trial with healthy and diseased cane grown intermingled and covering some 700 varieties are reported; the resistance of some 100 each of commercial and breeding canes and of original varieties are listed. Of the *S. officinarum* group, Black Cheribon and Striped Preanger are very susceptible and may be responsible for susceptibility in some of their hydrid offspring. The chief source of resistance is *S. spontaneum*, but the mode of inheritance is ill understood.

* * *

A preliminary study on the efficacy of soil application of B.H.C. emulsion in the control of early shoot borer (*Chilotrea infuscatella* Snell). H. DAVID. *Indian Sugar*, 1959, **9**, 387–388.—B.H.C. emulsion 20% at 5 lb per acre in 40 gal water proved the most effective control; net profit per acre by increased yield was Rs. 228 at cost of Rs. 52.

* * *

Preliminary report on the effect of varying concentrations of sulphurous and phosphoric acid and volume of the final solution on the preservation of arrowing and non-arrowing sugar cane stalks. M. T. ILAGA *et al. Sugar News* (Philippines), 1959, **35**, 593–601, 649–654.—The effect on the viability of cane stalks of SO_2 and H_3PO_4 in different concentrations and of total volume of solution are summed as: increased preservation of green matter and reduced loss of both sheath and blade moisture, the response to SO_2 being particularly marked. Lack of success with the standard solution is attributed to temperature and the high Ca content of the water.

* * *

Preliminary studies on the quantitative aspects of fertilization. *Sugar News* (Philippines), 1960, **36**, 21, 22.—A very brief review of fertilizer experiments carried out on a number of haciendas.

[1] See *I.S.J.*, 1958, **60**, 350; 1959, **61**, 229.

NEW C.S.R. CANE RESEARCH CENTRE

THE Colonial Sugar Refining Company has announced that it will build a plant research centre in Brisbane to conduct basic research on the sugar cane. The centre will be built on 3 acres of land and will cost about £300,000 to establish. It will be manned by a staff of five graduates and some assistants and will cost about £40,000 a year to run (C.S.R. already spends over £200,000 a year on research.)

The centre will be known as the David North Plant Research Centre after Mr. DAVID SHEPHERD NORTH, a retired officer of the C.S.R. Company, who did much pioneering work on control of plant diseases and on cane breeding. The scientist in charge of the establishment will be Dr. K. T. GLASZIOU.

The purpose of the plant research centre is to obtain basic knowledge about the physiology of the sugar cane plant. Research will be directed towards gaining an understanding, for example, of how the plant manufactures and stores sugar, and how one variety makes more sugar than another. The basic knowledge obtained is expected to be helpful in cane breeding and in various fields of sugar cane agriculture.

The establishment of the David North Plant Research Centre forms part of C.S.R.'s plan to increase its successful and long-standing work in breeding improved varieties of cane. The knowledge obtained should help plant breeders to grow sweeter canes, to breed canes with an extended period of maximum sweetness, to produce canes which will give juices which are easily processed, and possibly to develop canes which stand more erect and are easier to harvest mechanically.

The main feature of the David North Plant Research Centre will be a phytotron—a series of laboratories of special design containing rooms and greenhouses for growing sugar cane under conditions where the temperature, wind, humidity, light and other factors are strictly controlled. Air-conditioning plant will simulate varied climatic conditions.

Conditions in some of the rooms will be controlled to such a degree that to avoid contamination by insects and micro-organisms, staff working on the project, or visitors, will be required to wash and change clothing before entering.

The phytotron at the David North Plant Research Centre is expected to be completed and in operation during 1961. It will probably be the first in Australia and the fifth in the world. (S.C.I.R.O. have announced plans to build one near Canberra in 1962.) It will be the first phytotron devoted solely to sugar cane, and the first devoted to any single crop.

The great advantage of the phytotron at the research centre is that it will provide ways of varying many conditions and making numerous experiments quickly. Compared with slow and laborious field trials it can save years and years of work.

The long term effects of the C.S.R. Company's work in this field should help the Australian sugar industry reduce the costs of producing sugar so that Australia may keep sugar cheap on the home market and maintain a strong position in world markets. The benefits of the phytotron research will be extended, in accordance with the Company's normal practices, to Fiji.

The C.S.R. Company does not grow cane commercially itself in Australia and only to a small extent in Fiji, but makes the results of its research work in cane agriculture available to the independent cane farmers in the Australian sugar industry. It also has a special staff in Fiji engaged in extension work amongst the growers there.

There is no doubt, irrespective of the present state of overproduction of cane, that research work aimed at increased efficiency and lower costs per ton of cane and of sugar must proceed; indeed if the South Pacific raw sugar industries are to be competitive and economically viable in the future, progress in those directions is essential.

White grub of sugarcane and its control. V. L. SAPLALA. *Sugar News* (Philippines), 1960, **36**, 63–65.—The most efficient means of controlling the 5 species of white grubs occurring in the Philippines are found to be preventive spraying with "Aldrin," BHC, or "Chlordane" at planting, followed if necessary by further spraying on onset of infestation. Supplementary control by spraying trees wihch harbour the grubs with DDT, "Aldrin" or "Dieldrin" is also recommended.

* * *

Control of the black beetle. C. L. TOOHEY. *Cane Growers' Quarterly Bull.*, 1960, **23**, 86.—Damage by *Heteronychus sanctae-helene* has been reported earlier.[1] Its localized appearance makes general treatment of the setts uneconomic but spraying with "Lindane" on attacked cane up to one month's growth gives moderate control.

* * *

Use "Lindane" advantageously but cautiously. R. W. MUNGOMERY. *Cane Growers' Quarterly Bull.*, 1960, **23**, 91.—The advantages of spraying "Lindane" as against spreading BHC dust both in effectiveness and comfort to the user are recorded, but care in handling is recommended.

* * *

Four new varieties. ANON. *Cane Growers' Quarterly Bull.*, 1960, **23**, 92–94.—The 4 new varieties of the "Q" series, "Q" 69, "Q" 71, "Q" 72 and "Q" 73 are described.

* * *

A cane rake for heavy work. ANON. *Cane Growers' Quarterly Bull.*, 1930, **23**, 94.—A heavy duty rake, which will stand up to high-powered tractors working over difficult land, is illustrated and briefly described.

[1] *I.S.J.*, 1959, **61**, 101.

BLAIRS

Sole Makers of
MULTIPLEX FILM EVAPORATORS

COMPLETE

SUGAR

FACTORIES & REFINERIES

DISTILLERIES, ABSOLUTE ALCOHOL & CHEMICAL PLANTS

Our illustration shows a close-up of Cast Steel Gearing on a Blairs 35" dia. × 78" long 12-Roller Milling Plant operating in Brazil.

BLAIRS LIMITED

WOODVILLE STREET · GLASGOW, S.W.1

Cables: "BLAZON, GLASGOW"

London Office: **38 Grosvenor Gardens, S.W.1.** *Cables:* "Multivap, Sowest, London"

THE GREEN-SMITH *Massecuite* REHEATER

(PATENT APPLIED FOR)

FINAL MASSECUITE REHEATING

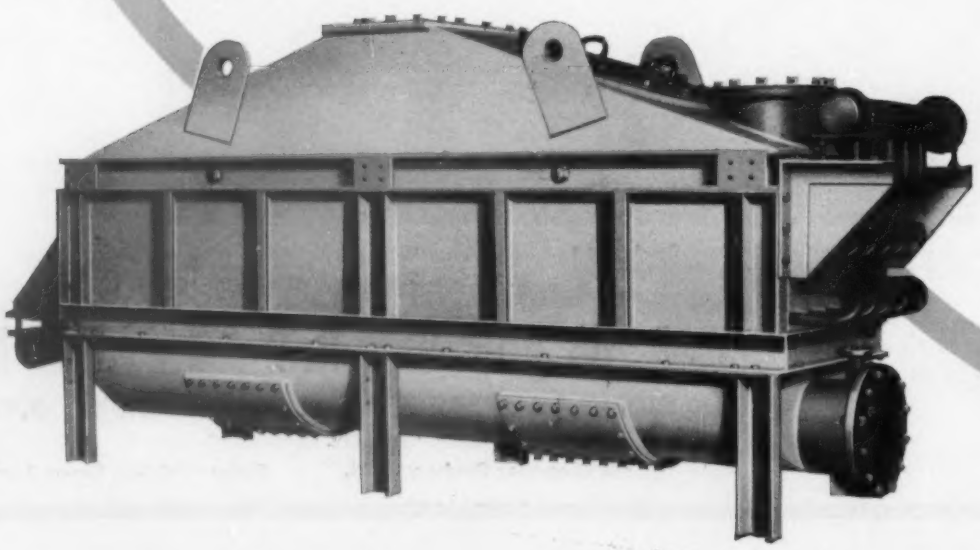
Improved purging will result from reheating to the mother syrup saturation temperature owing to the reduced viscosity.

Less recirculation of impurities will occur.

Lower purity molasses can be eliminated with further cooling and yet reheated massecuite will be as easy to centrifuge.

Higher yield of sugar will be a direct consequence of lower purity molasses.

Greater throughput for each centrifugal machine can also be achieved as lower viscosity will reduce the spinning time.



GREEN-SMITH REHEATER

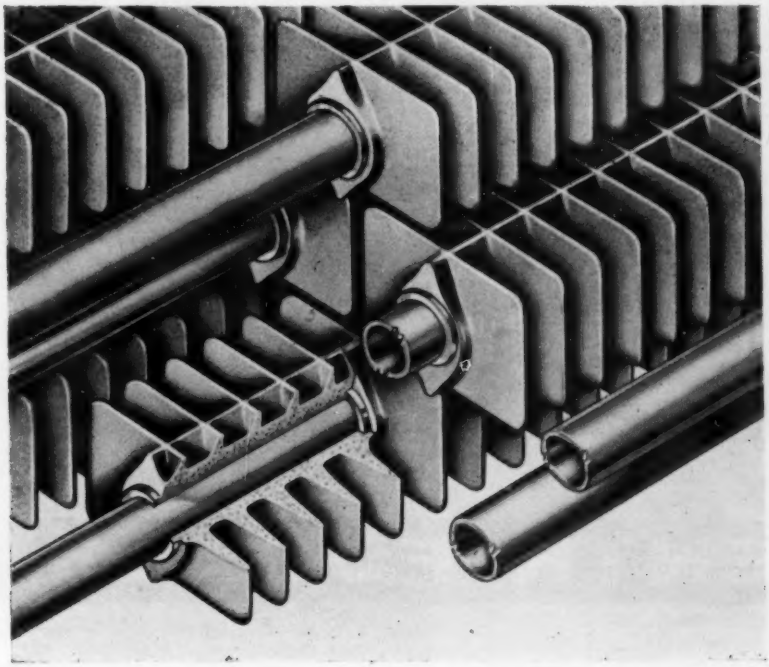
No redissolution of crystal sucrose will occur as the heating water is at about mother syrup saturation temperature.

Minimum residence time is achieved because the ratio of heating surface to massecuite volume is so high.

Maximum heating will be obtained in the **minimum time.**

Minimum temperature difference will be needed between input water and output massecuite and this should be about 2°C.

No moving parts are involved and therefore there will be **no Power Load** and **Negligible Maintenance.**



The Green-Smith Massecuite Reheater shown opposite has been installed in the new sugar refinery at Ndola Northern Rhodesia.
Others are in process of installation.

A. & W. SMITH & CO. LTD.

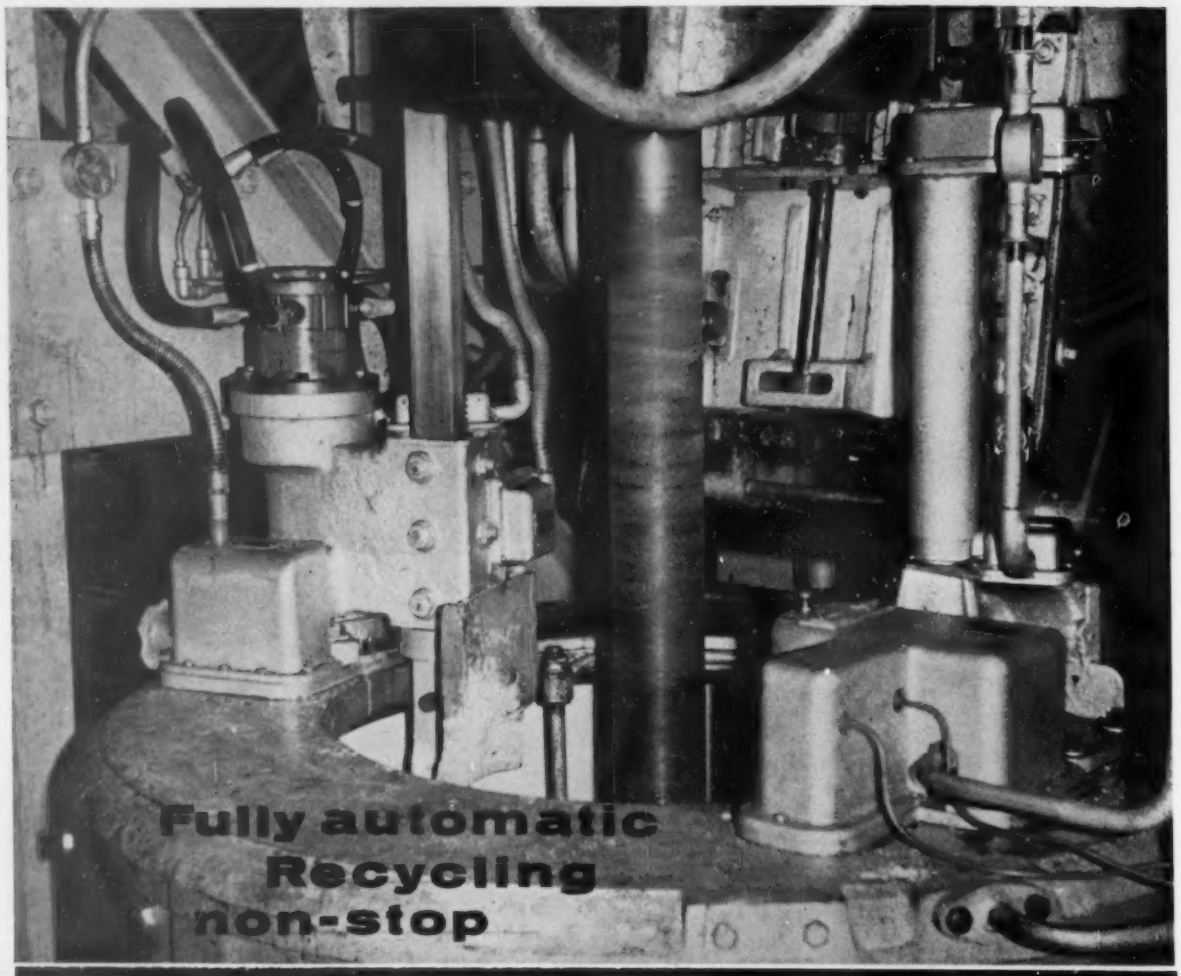
SUGAR FACTORY AND REFINERY ENGINEERS

21 MINCING LANE • LONDON, E.C. 3

Cable Address : "Sugrengine London"
Works : COOK STREET, GLASGOW, C.5

SMITH

Publication No. GSR-59 with questionnaire available on request.



CENTRIFUGALS

Continuous operation on all grades of sugar—after-product, raw sugar, affination or whites—is brought to a new level of productive efficiency with this latest Pott, Cassels & Williamson design, one of the best all-round centrifugals available today.

This centrifugal incorporates a complete and fool-proof system of controls with adequate interlocks. It is intended for non-stop working without any operator in attendance, and has been fully tested with complete success.

A catalogue is now available; please write for your copy.

POTT, CASSELS & WILLIAMSON LTD.

A member of THE MIRRLEES WATSON GROUP

MOTHERWELL, LANARKSHIRE, SCOTLAND.

Cables: Pott, Motherwell.

MANUFACTURE OF BAKERS' YEAST BY CONTINUOUS FERMENTATION

Plant and Process

By A. J. C. OLSEN, M.Sc. (Copenhagen), M.I.Chem.E. (London)
(The Distillers Co. Ltd.)

Slightly condensed from Chemistry and Industry, 1960, 416–425.

PART I

Introduction

THE plant and process I shall describe are suitable for the production of up to 300 tons of bakers' yeast in a 7-day week by a so-called "continuous fermentation". I must emphasise right away that "continuous" is not synonymous with "perpetual". Up to date the duration of the "steady state" of fermentation has not exceeded 80 hours, but we expect that this period can, if desired, be extended to 5 days (120 hours).

It must be borne in mind that the problem is not so much to produce yeast economically and in large quantities, but to ensure a product of the highest possible quality for the requirements of the baking industry and a product which is competitive with similar products produced in this country and elsewhere.

I would like to provide a background by mentioning a few significant dates in the history of the yeast industry:

(1) The "Vienna Process" (Altes Wiener Verfahren) developed in Austria from about 1846 by MAUTNER was the first to give a commercial product with moderately good baking strength but poor keeping quality. Raw materials were barley and other cereals and the yield about 10–12 kg yeast and 28 litres alcohol from 100 kg raw material. This process was still operated in Great Britain in 1937 (Port Dundas Distillery, Glasgow).

(2) The "Air Process" developed by EUSEBIUS BRUUN, Copenhagen, in 1877, still operated in Great Britain in 1927, originally giving about 20% commercial yeast and 20% alcohol from grain.

(3) The "Wort Addition Process" (Zulauf). Important patents were: (*a*) Combine of German Alcohol Manufacturers. German Patent 300,662, priority 17.3.1915, published 12.9.1919. (*b*) MOCKOVITS. Hungarian Patent 70,215, priority 24.9.1915, published 11.1.1917. (*c*) Danish Fermentation Industries Ltd., and S. SAK. Danish Patent 28,507, priority 5.7.1919, published 16.8.1920.

Processes based on these three patents were introduced universally in the years 1920–1925. They produced yeast from grain, molasses or mixtures of both with or without simultaneous formation of alcohol in a batch fermentation. Yeast yields of approximately 100%, based on molasses weight were common. Baking properties and keeping qualities were far superior to those obtained from previous processes.

During these years the control of process was handed from brewers to university graduate chemists, and the construction of plant from coopers to coppersmiths and chemical plant manufacturers. These processes, with minor modifications and with labour saving plant and technique, are operated in most yeast plants today as batch processes.

(4) The "Continuous Fermentation". It was soon realized that the "Wort Addition Process" with exponential or near exponential feed offered possibilities for continuous addition of nutrients and continuous withdrawal of yeast from a fermenting vessel or from series-connected vessels. Publications and numerous patents appeared of which I shall mention a few of the early and typical ones.

(*a*) Combine of German Alcohol Manufacturers. German Patent 303,221, priority 1.4.1915, published 4.11.1919. (*b*) Fleischmann Company and W. H. F. BÜHRIG. U.S.A. Patent 1,730,876, priority 14.5.1925, published 8.10.1929. (*c*) International Yeast Co. Ltd. and A. J. C. OLSEN. British Patent 299,336, priority 21.6.1927, published 22.11.1928.

The first of these patents (German 303,221) describes the idea of continuous wort addition with simultaneous withdrawal of yeast with or without relatively small quantities of alcohol and using one vessel only.

The second (U.S.A. 1,730,876) uses a "main fermenter" with additional vessels for ripening.

The third (British 299,336) claims the necessity of using a series of vessels to enable control of environment to suit the growth stages in individual vessels, thereby achieving the desired *quality* of end product.

When looking back on the dates of these patents it may surprise that a period of more than 30 years has passed from "idea" to "action". Many reasons or excuses can be suggested but the dominating difficulties were undoubtedly as follows:

(1) Risk of infection.

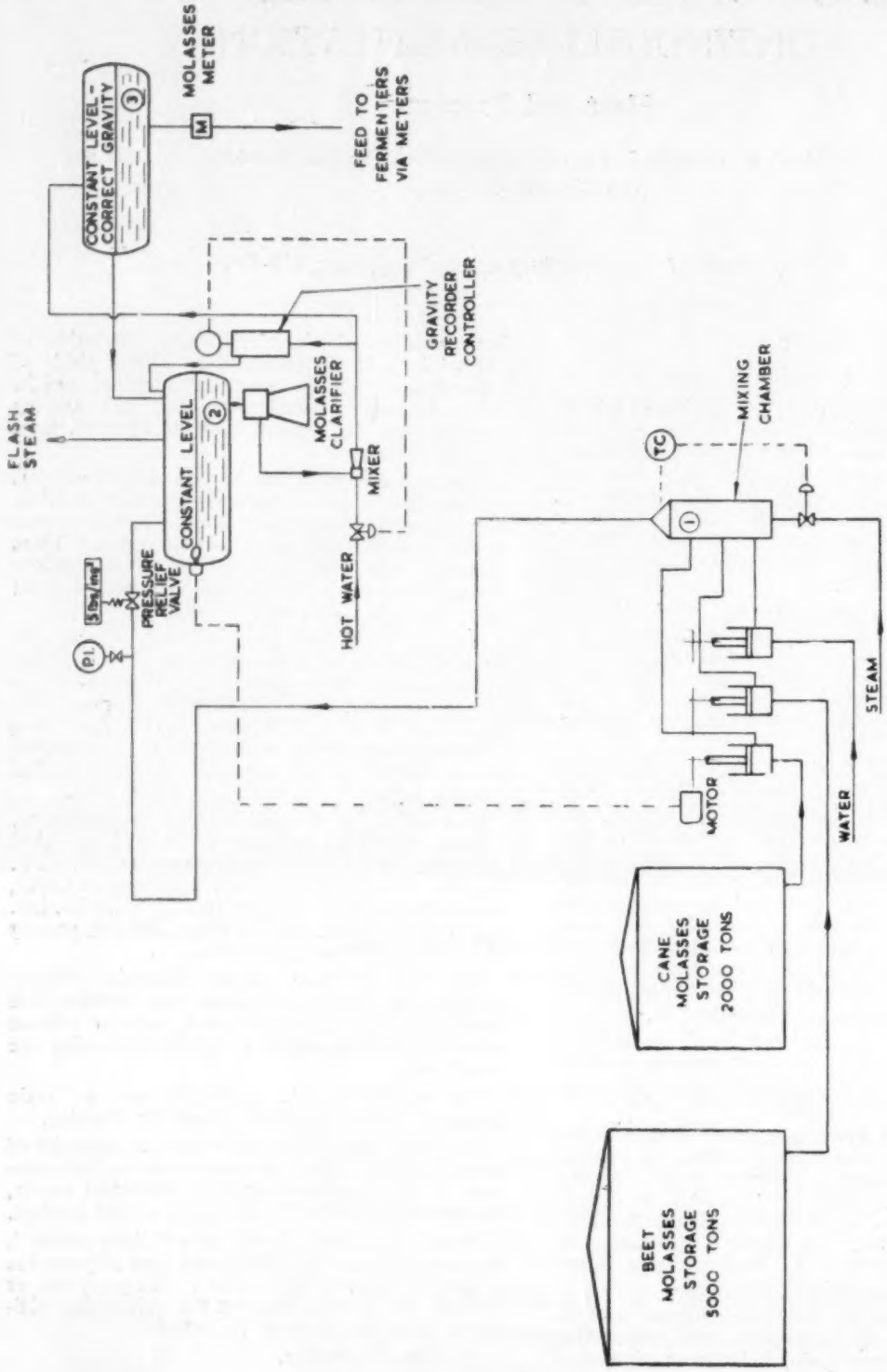


DIAGRAM SHOWING PLANT FOR CONTINUOUS METERING, DISSOLVING, AND STERILISING OF MOLASSES.

Fig. 1

(2) Difficulties in mastering the simultaneous control of many factors entailed in forced propagation (on a large scale) of live cells on which must be "impressed" standardized qualities, such as fermentation activity, preservation, colour and a certain ratio between dry matter and plasticity of the yeast block.

Such propagation involves continuous control of flow rates for feed and air, temperature, pH, concentrations, etc. Yeast cultures, during recent years, have been crossbred to give better performance but at the same time they have developed the sensitivity of a very delicate plant.

The risk of infection and the difficulties of control have been minimized by improved plant design and the availability of reliable control instruments.

About ten years ago we decided the time had come to build a plant which would be suitable for continuous operation. Some of the fundamental considerations were:

(*a*) Stainless steel where possible to assist maintenance and easy cleaning.

(*b*) A larger number of comparatively small fermenting vessels in preference to a smaller number of larger vessels. This enables cooling by jacket, thus avoiding coils and leaving the interior free of obstructions so as to facilitate cleaning.

(*c*) Pipelines for "cleaning in position" by flushing with caustic soda solution or other detergents.

(*d*) Continuous methods for preparation and supply of chemicals and molasses solution, and continuous filtration.

(*e*) Fermentation by batch process which could at a later date be replaced by continuous fermentation without much alteration to plant.

Before describing the changeover from batch to continuous I shall try to demonstrate the general principles as operated in the batch process. I shall do this by means of some diagrams and tables which will explain the problems involved in the changeover and in particular emphasize the advantages to be obtained from the continuous process.

Although the title of this paper is "Manufacture of Bakers' Yeast by Continuous Fermentation—Plant and Process", it would be difficult to describe the fermentation process alone without showing it in relation to plant which enables *the whole* of the production to be on continuous lines. For instance, molasses solution and chemical solutions must be prepared in a continuous manner and I will first show, therefore, some simple diagrams illustrating this part of the process.

Fig. 1 shows how two types of molasses, together with water, are metered by means of one pump, thereafter flash sterilized by means of steam on their way to a small overhead supply tank. The sterilized molasses solution from this supply tank, if required, is passed through a continuous molasses clarifier. The clarified molasses solution is automatically

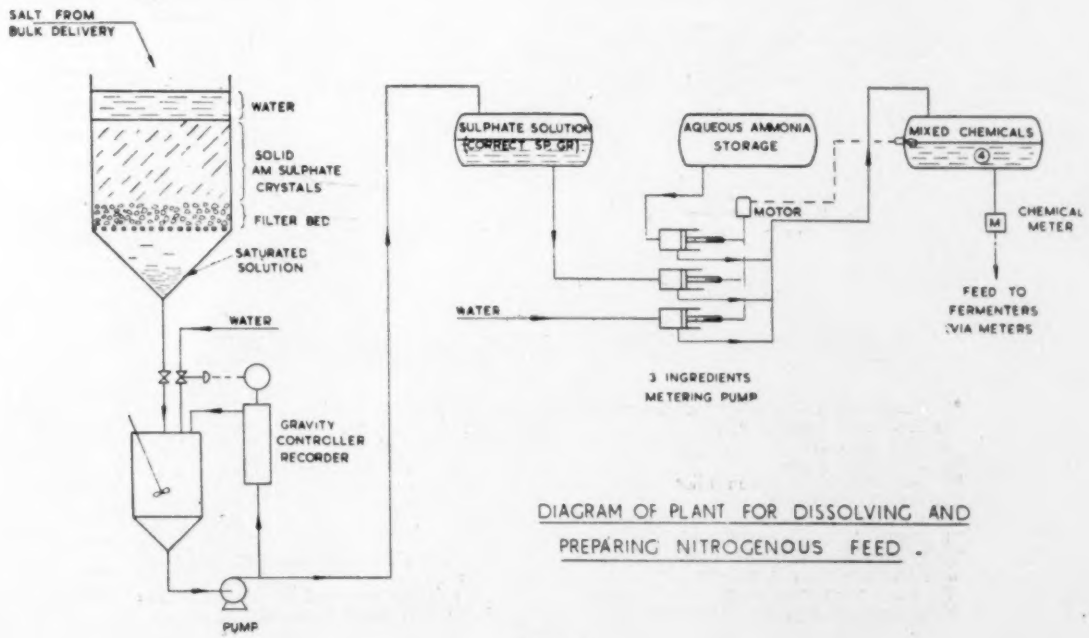
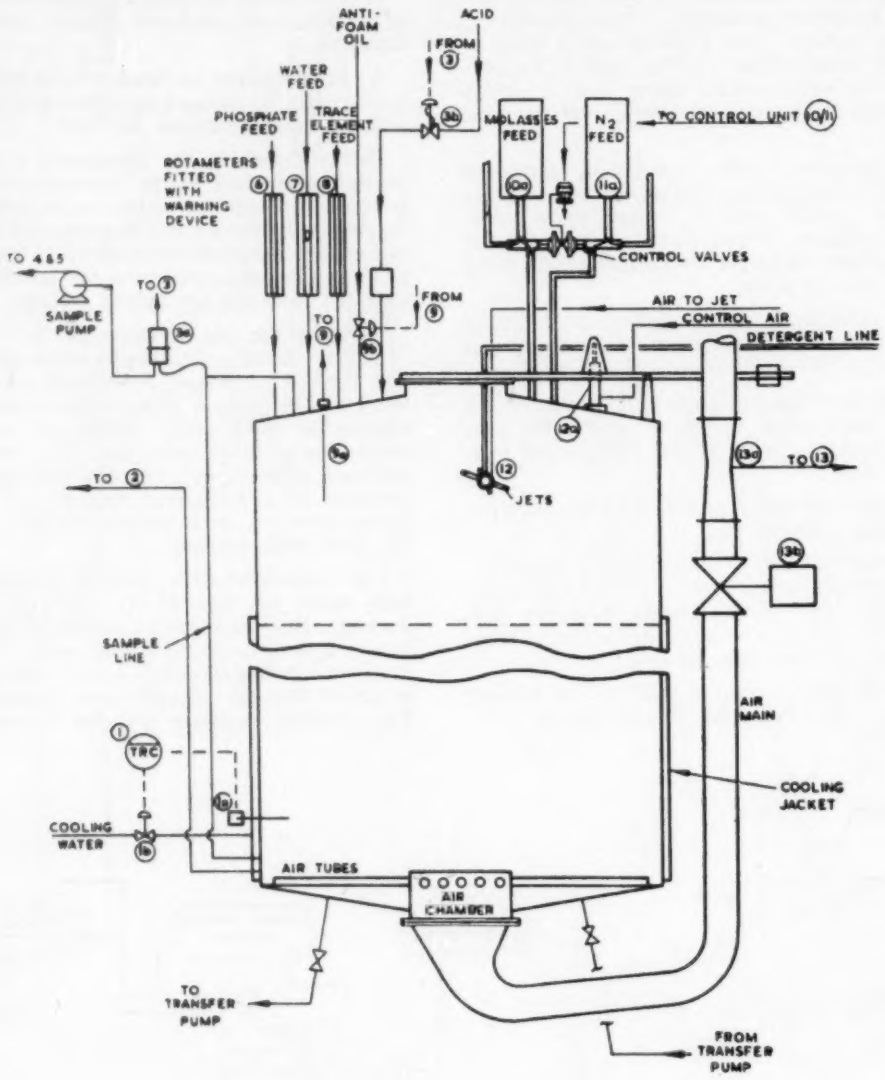


DIAGRAM OF PLANT FOR DISSOLVING AND PREPARING NITROGENOUS FEED.

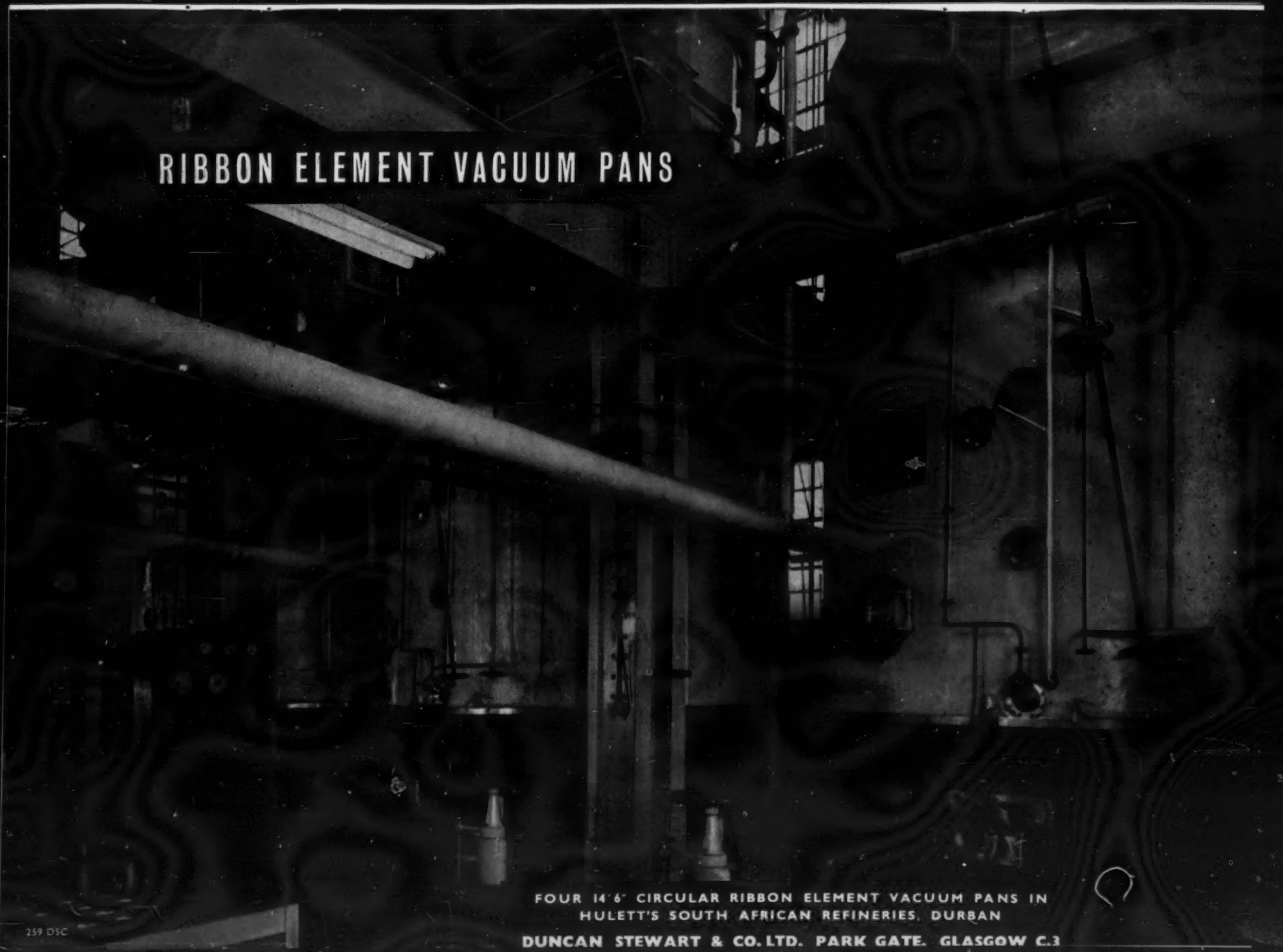
Fig. 2



A FERMENTER SHOWING ATTACHED INSTRUMENTS.

*1 Temperature Controller and Recorder
1a Resistance Thermometer
1b Control Valve
*2 Fermenter Level
*3 pH Recorder and Controller
3a pH Electrode System
3b Control Valve
*4 Yeast Concentration Recorder
*5 Formol Recorder Controller
6 Phosphate Feed Rotameter
7 Water Feed Rotameter
8 Trace Element Feed Rotameter
*9 Foam Controller
9a Foam Detector
9b Control Valve
10/11 Dosage Control Unit
10a Molasses Feed
11a Nitrogen Feed
12 Rotor Jet
12a Power Unit
*13 Air Controller Recorder
13a Venturi
13b Power Operated Air Control Valve
* Indicates Panel Mounted Instruments.

Fig. 3



FOUR 14'6" CIRCULAR RIBBON ELEMENT VACUUM PANS IN
HULETT'S SOUTH AFRICAN REFINERIES, DURBAN

DUNCAN STEWART & CO. LTD. PARK GATE. GLASGOW C.3

259 DSC

Suchar ACTIVATED CARBON

effectively eliminates color, taste and odor from sugar

Specifically developed for the cane sugar industry, SUCHAR activated carbon is the best way to remove colors, odors and flavors from sugar liquors.

Amazing surface area and porosity make it the most efficient carbon you can use. And since *less* SUCHAR can treat *more* sugar, it's economical, too. Actually cuts your carbon costs by 10% or more.

For many years, SUCHAR has helped the cane sugar industry produce better sugar with activated carbon, Auto and FAS-FLO* Filters and expert engineering service. We'll be pleased to help you. As a start, let us quote on your requirements.

*Reg. TM of FAS-FLO Filter Corporation, New York

SUCHAR SALES CORPORATION

CONSULTING ENGINEERS

76 Beaver Street
New York 5, N. Y.

Cable Address: "SUCHARING" N.Y.

EXCLUSIVE DISTRIBUTORS OF SUCHAR ACTIVATED CARBON FOR THE CANE SUGAR INDUSTRY

SUCHAR
FOR CANE

corrected for density before it passes to the metering devices which continually supply several fermenting vessels. The whole of the process, including pumping from bulk storage tank and feeding the fermenters according to a pre-set programme, is fully automatic and operates without supervision.

Fig. 2 shows a similar continuous and fully automatic installation for preparation of a solution supplying the fermenting vessels with nitrogenous feed, consisting of an aqueous ammonium sulphate solution plus ammonia liquor. The diagram shows how crystalline ammonium sulphate is placed in a so-called saturator ; a flow of water passes through the sulphate leaving in the form of saturated, or nearly saturated solution. This is continuously diluted with water to obtain the desired concentration; the flow of dilution water is controlled by the instrument which checks on the density after mixing. This sulphate solution, together with aqueous ammonia which is taken direct from the bulk storage containing 25% ammonia in solution, is metered together with additional water through a three-stage proportioning pump which delivers the blended solution to the instruments feeding the fermenting vessels. Again, the whole of this process is operated continuously throughout the week and is fully automatic, only supervised on the indicator board in the control room.

Molasses solution and nitrogenous solution are the major nutrient requirements of the fermentation and therefore justify continuous handling as has just been shown. Other chemicals are required but in much smaller quantities, for instance, di-ammonium phosphate and magnesium sulphate, which are dissolved in batches and metered to the fermenters. Sulphuric acid is metered in a concentrated form directly to the fermenters, the flow being controlled by pH instruments.

Water used for jacket cooling, or added directly to the fermenter as dilution water, is supplied directly from the wells via overhead tanks, after chlorination.

Fig. 3 shows one fermenting vessel fitted with flow meters and controls and indicates the cooling jacket and the clean interior of the vessel, the only inside fittings being the rotating high pressure spray nozzles and the air distribution system used for cleaning and sterilizing of the vessel.

The top of the vessel, containing meters and control instruments, is inside the building while the remainder of the vessel is outside in the open. In the Dovercourt installation five fermentation vessels are placed on either side of the building, all being in stainless steel, 20 ft high × 12 ft 6 in diameter.

(*To be continued*)

BRITISH SUGAR CORPORATION LIMITED

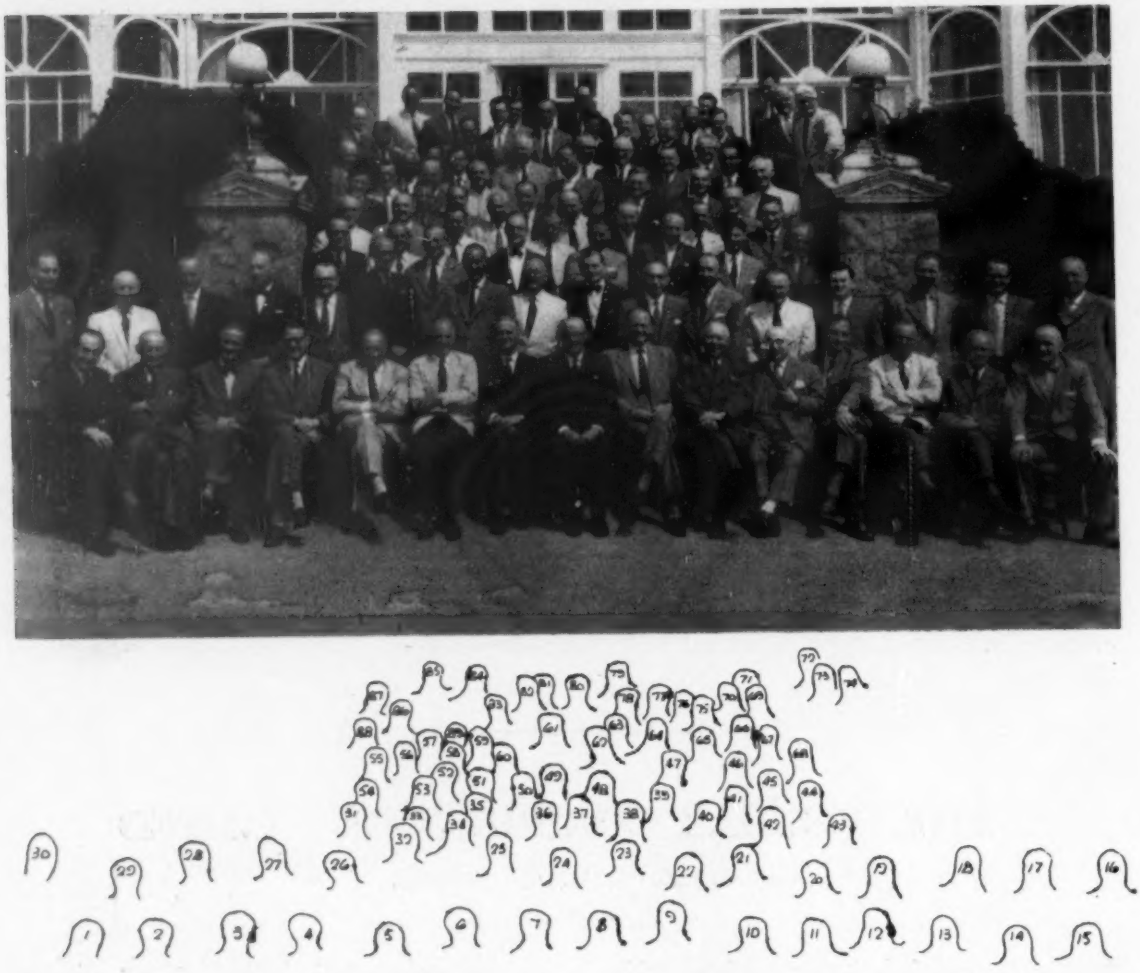
13th TECHNICAL CONFERENCE

THE 13th Technical Conference of the British Sugar Corporation was held at the Grand Hotel, Folkestone, Kent, during the 22nd–24th June, many visitors from the Continent and U.S.A. being present in addition to the Corporation's technical staff. J. CAMPBELL MACDONALD, O.B.E., reviewed past results and outlined future aims of the Corporation. Following this Dr. A. CARRUTHERS and his associates presented their paper "Ion exchange in the sugar industry" and R. M. J. WITHERS read his paper "Control engineering applied to the British Sugar Corporation".

Mr. SVANTE WRAMSTEDT of the Swedish Sugar Corporation presented his work describing "Recirculation of over-saturated preliming sludge concentrate" which was followed by three films, two presented by G. TIBO and his colleagues from Raffinerie Tirlemontoise, Belgium, depicting the new juice station at Longchamps and the separation of the floc from prelimed beet juices, respectively. The third film, a sound film featuring the Berlin Sugar School was presented by Prof. H. HIRSCHMÜLLER, Director of the School.

On the following day, papers were read on "Juice composition and its relation to factory performance" (Dr. CARRUTHERS and his associates) and on methods of waste water treatment—"Legal aspects and physical treatment" (O. H. PHIPPS) and "Composition and treatment of effluents (Dr. CARRUTHERS and his associates). Crop prospects for the 1960/61 campaign were discussed by G. F. N. BATTLE, Executive Director of the Corporation, and after lunch, a sight-seeing tour was arranged for delegates, with the Conference Dinner in the evening.

Progress reports from previous Conferences were reported on the following morning, namely "Sucrose crystallization in thin films" by H. E. C. POWERS, of Tate & Lyle Ltd., "Pulp pressing" by S. A. MORRISH, and "Heat usage and power" by P. SCOTT. With a summary by J. CAMPBELL MACDONALD the Conference came to an end.



Key: 1. O. STRAKOSCH (Austria). 2. J. PAUL (France). 3. J. DEDEK (Belgium). 4. B. DIEDEN (Sweden). 5. W. G. DE PROSKOWETZ (Austria). 6. A. J. CHAMPION, J.P. (Director, B.S.C. Ltd.). 7. P. REICHEN (Switzerland). 8. J. CAMPBELL MACDONALD, O.B.E. (Conference Chairman). 9. L. KAYSER (Germany). 10. G. TIBO (Belgium). 11. J. BOLIN (France). 12. O. VON LOESSL (Germany). 13. H. CRANSTON MEIN (Personnel Officer, B.S.C. Ltd.). 14. J. A. COWIE (Technical Supervisor (retired)). 15. G. BRADLEY (Eire). 16. H. L. W. KONING (Holland). 17. N. J. LOFT (Denmark). 18. Z. THORGERSEN (Denmark). 19. N. A. YOUNG (Felsted). 20. P. MATISCHEK (Allscott). 21 C. BOINET (France). 22. I. L. SLATOPOLSKY (Ely). 23. K. C. SINCLAIR, O.B.E. (Assistant to Chairman, B.S.C. Ltd.). 24. W. PARKER, M.B.E. (Chief Chemist). 25. H. HIRSCHMÜLLER (Germany). 26. P. SCOTT (Combustion Engineer). 27. S. A. MORRISH (Deputy C.T.O.). 29. G. H. LYON (Brigg). 29. J. H. WILSON (Sugar Packeting Manager). 30. H. BRÜNICHE-OLSEN (Denmark). 31. J. I. GRANT (Bardney). 32. A. CARRUTHERS (Director of Research). 33. T. E. TRINDER (Selby). 34. J. DUBOURG (France). 35. T. RODGERS (King's Lynn). 36. WHITNEY NEWTON (U.S.A.). 37. F. B. WEST (Cantley). 38. J. HENRY (Belgium). 39 J. LOWET-OURY (Belgium). 40. R. SAUNIER (France). 41. N. M. ADAMS (Deputy C.T.O.). 42. H. J. HONGISTO (Finland). 43. W. B. BOAST (Sales Technologist). 44. S. WRAMSTEDT (Sweden). 45. W. J. BISSELL (Kelham). 46. A. E. LYON (Cupar). 47. R. HULPIAU (Belgium). 48. G. R. MILBURN (Personnel Officer). 49. P. M. G. DIXON (Spalding). 50. B. S. BROOKS (Kelham). 51. H. ELLIOTT (Technical Supervisor). 52. H. A. RYCRAFT (Wissington). 53. M. NEWMAN (Wissington). 54. A. E. PIKE (Colwick). 55. J. GRAY (Eire). 56. T. LANGHAN (Ipswich). 57. W. P. FORD (Poppleton). 58. H. D. MACFIE (Westburn Sugar Refineries Ltd.). 59. R. M. J. WITHERS (Control Development Engineer). 60. L. N. CLOVER (Peterborough). 61. R. JORISCH (Technical Supervisor). 62. D. P. SCHIPPERS (Holland). 63. R. J. M. VAN DER BURG (Conference Secretary). 64. F. M. CHAPMAN (Tate & Lyle Ltd.). 65. C. J. ASSELBERGS (Holland). 66. J. MATTON (Sweden). 67. J. P. LEMAIRE (Belgium) 68. A. R. RICHARDSON (Technical Supervisor). 69. P. GALLAGHER (Research Dept.). 70. H. LEMAIRE (Belgium). 71. M. SHORE (Research Dept.). 72. D. R. DICKENSON (Tate & Lyle Ltd.). 73. R. MARSH (Kidderminster). 74. W. WALKER (Colwick). 75. L. BECQUET (France). 76. W. WOODWARK (Central Laboratory). 77. J. F. T. OLDFIELD (Research Dept.). 78. J. V. DUTTON (Research Dept.). 79. O. H. PHIPPS (Effluent Officer). 80. W. LANYON (Bury St. Edmunds). 81. L. C. MANNING (Research Dept.). 82. M. L. A. VERHAART (Holland). 83. H. TEAGUE (Research Dept.). 84. A. SMET (Belgium). 85. N. H. BRINTON (Deputy Chief Chemist). 86. J. A. E. RICH (Asst. Control Development Engineer). 87. A. LANGEN (Germany). 88. H. E. C. POWERS (Tate & Lyle Ltd.). 89. D. HIBBERT (Central Laboratory).

THE SUGAR INDUSTRY IN TAIWAN

Condensed from Taiwan Sugar, 1959, **6**, (10), 33; 1960, **7**, (1), 22–25.

THE sugar industry of Taiwan has developed over more than three hundred years. Not until the turn of the present century, however, did the industry undergo a remarkable expansion. Under the Japanese occupation, well-equipped and modernized sugar mills multiplied, bringing annual production to close on a million tons. A reversal of progress set in during World War II when most of the sugar mills were damaged by aerial bombing. Following VJ day, the Taiwan Sugar Corporation was established and has reconstructed all the paralysed sugar mills in spite of tremendous difficulty. The efforts directed by the Corporation towards plant rehabilitation and agricultural improvement have resulted in raising annual sugar production to 800,000 – 900,000 metric tons, making the island once again one of the major sugar producers of the world.

The industry is largely under the unified management of the Taiwan Sugar Corporation. From the TSC comes all the centrifugal sugar, i.e. raw and white sugar. Small mills outside the Corporation produce only brown sugar in the neighbourhood of 20,000 metric tons per year. The total assets are valued at around U.S. $100 millions, the Corporation owning 25 sugar mills of 54,000 metric tons aggregate daily capacity together with 40,000 ha of cane plantations and 3400 km of railway; six alcohol distilleries with a total daily capacity of 110,000 litres of alcohol, one modern yeast plant of 40 metric tons/day dried yeast capacity and two smaller-scale yeast plants, one modern bagasse board factory and another board plant of smaller scale, one insecticide plant with an oil extraction unit, producing BHC, DDT, peanut oil and cake, etc., an agricultural machinery and engineering office, two animal feed plants producing antibiotics in addition to animal feed, a pig breeding station, and a limestone quarry.

The Corporation draws its cane supply both from its own plantations (30%) and from contracted farmers (70%), extending cash and fertilizer loans to the latter, and undertaking the transportation and processing of farmers' cane. In return, the contracted farmers agree to surrender to the Corporation 50% of the sugar extracted from their cane. Of the remaining 50% of sugar belonging to the farmer, the Corporation agrees to buy any part of it at a guaranteed price fixed on the basis of the prevailing market prices of the competitive crops. Sponsored by the Corporation, the Service Station for Taiwan sugar cane farmers was organised in 1955 with the purpose of rendering service to its members in the form of technical "know-how," irrigation, mechanical ploughing, loans and group insurance.

The total mileage of the TSC railway system is 3400 km, of which 700 km are open to the public for freight and passenger carrying. There are 17,000 employees, exclusive of temporary hire during the grinding season. The TSC provides living quarters, dormitories, clinics, schools and other welfare facilities.

The proceeds of sugar export sales account for 60% of Taiwan's total foreign trade receipts, and the hundreds of millions of dollars spent by the Corporation in agricultural loans and in payments for farmers' sugar benefit the rural community, while TSC spending as a consumer of fertilizers and gunny bags and user of railroads, ships, etc., keeps other industries going.

Sugar Cane Agriculture

Agricultural improvement during recent years on TSC farms and contracted planters' farms is evidenced by the increase of sugar yield per hectare from 6 metric tons in 1950 to 9·6 metric tons in 1956. During the same time, the average cane growing period was reduced from 18 months to 15 months. All this represents the effectiveness of planting, cultivation, fertilization, variety selection and control of diseases and pests.

Taiwan lies between latitudes 21°53′ and 25°18′ N, with a predominantly sub-tropical climate. The south which is chacterised by a hot rainy summer and a cool dry winter is particularly favourable to the growing of cane. These are two major planting seasons: January—March (spring) and August—October (autumn planting). Spring planted crop requires only 12 months growth as compared with18 months for autumn planting, but the latter is the standard method used for 60% of the cane area because of the scarcity of rainfall in the spring. At present, 70% of the TSC cane crop is plant cane and 30% ratoons. The inter-planting of cane and rice is considered profitable by the farmers and is being adopted on an ever-increasing area. Cane varieties are both island-bred, e.g. F 134, and imported, e.g. N:Co 310 from Natal which occupies 80% of the total TSC cane area.

The area under mechanised farming is rapidly increasing and many farmers make it a condition of planting cane that the Corporation should prepare their land using tractors. The area under irrigation has reached 30,000 ha, compared with 14,000 ha in 1950. A sound rotation system with leguminous plants is practised with composting of manure, bagasse, filter-cake and trash. In addition approximately 80,000 tons of ammonium sulphate, calcium cyanamide, muriate of potash and superphosphate are distributed to the TSC plantations and contracted farmers.

In Taiwan are found all the commonly known diseases—mosaic, red rot, chlorotic streak, leaf scorch, pineapple disease and downy mildew—while the most damaging pests are the borer, woolly aphis and cane beetle. Preventative and curative measures taken by the TSC include selection of resistant varieties, seedling treatment, and application of insecticide and fungicide.

Processing and Distribution of Sugar

The three grades of sugar produced by the Corporation are: (i) Superior White Crystal sugar (SWC) of over 99·5 pol and moisture not exceeding 0·2%, (ii) B-grade White Crystal sugar (BWC) of over 98·5 pol and moisture not over 0·5%, and (iii) Raw sugar (RSC) of 96–97·5 pol. Both carbonatation and defecation are used by the TSC mills, the former in making SWC sugar and the latter for BWC and RSC sugar. Subsequent to the completion of its rehabilitation programme, a number of technological improvements have been effected in the TSC mills. These include partial modernization of equipment, installation of various controls and establishment of an inspection system, and are reflected in a higher efficiency of performance and in better sugar quality.

Warehouse sugar is packed in 100-kilo gunny bags and stored in the factory warehouses or immediately shipped to Kaohsiung or Keelung. Factory warehouses have a total capacity of 500,000 metric tons and harbour warehouses 100,000 tons. Since 1949, sugar sales have been extended to most of the sugar consuming countries. Taiwan possesses a geographical advantage over other exporting countries by its proximity to the Asiatic and Middle East countries. Taiwan sugar is noted for its good quality, neat packing and promptness of delivery.

By-Product Utilization

The Corporation has in recent years directed more of its attention by better utilization of its two main by-products, bagasse and molasses. A programme is under way, the essentials of which are the manufacture of bagasse board, and the manufacture of yeast for pig feed. In view of the universal demand for timber and of the high price it commands, bagasse board as a building material has a ready market. TSC has just completed with U.S. aid a modern hardboard plant in Chang-hua which, judging from its capacity, is the first large board-making plant in the Far East. Through this plant it is expected to turn an important part of the 1,600,000 metric tons of bagasse produced annually into a more profitable commodity both for local consumption and for export.

The Corporation has for years manufactured food yeast from molasses. In expanding the use of yeast, a modern plant has been set up with U.S. aid to manufacture yeast from molasses and to turn the yeast, mixed with potato, powdered animal bone and powdered dried fish, into animal feed. The project is intended to produce a kind of animal feed high in vitamin content but as cheap or cheaper than soybean cake. The pig-raising project has been undertaken chiefly with a view to securing a supply of farm manure. The effectiveness of using yeast as the main protein feedstuff has been well demonstrated by the pig-breeding station.

Besides the foregoing, there are numerous other ways of by-product utilization. Studies are being undertaken to explore the possibility and profitability of processing sugar further into paints, detergents, citric acid, and plasma.

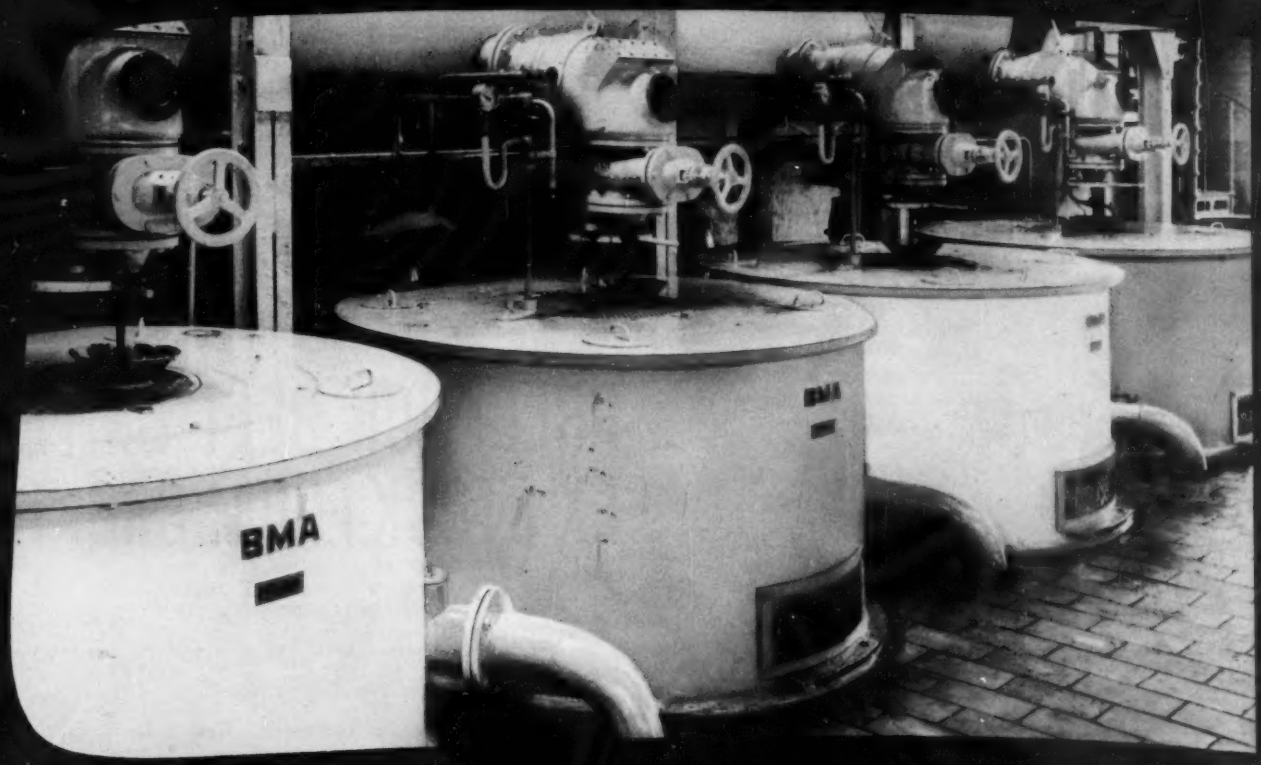
Future Developments

To assure operational safety, to improve product quality and to effect manufacturing economy, modern efficient equipment is to replace obsolete or worn-out machines in the factories. Orders have been placed for 13 boilers, 6 turbo-generators and 60 high-speed centrifugals, and these account of 60% of the expenditure. Sugar coolers and dryers, clarification equipment, instrumentation, electrical apparatus, etc. make up the balance. The TSC Engineering Dept. have recommended standardization of the capacity or size of equipment (rather than the type or model) which will provide interchangeability of such equipment between factories.

In order to reduce the season at Wanli mill, grinding capacity is to be increased from 2200 to 3000 metric tons with possible future expansion to 5000 tons. The obsolete 700-ton mill train is to be replaced with a 1500-ton train from the closed Chichow mill. At Nantsing, the dryer, cooler, screen, conveyors, etc. of the packing room are to be remodelled to permit making of an extra-fine granulated sugar for an individual buyer.

In addition, the Corporation has studied the feasibility of bagasse depithing at the mills, at the request of the pulp mills which consume a considerable quantity of bagasse. Investigations have revealed that a large part of the pith could be separated and burnt as fuel, while clean bagasse fibre can be made available to the pulp mill. A tentative plan is to provide 9 mills with such depithing equipment, at an investment of U.S. $500,000.

A study has also been made of the potentiality of furnishing by-product power during the sugar season when the hydro-electric power plants run short of water. With steam boosted to 900 p.s.i. pressure and 1000°F temperature, and by letting the steam go through a bleeder and pass-out turbine to reduce its pressure to 15 p.s.i. for process heating, considerable power could be generated. As an example, if five big TSC sugar mills are provided with such an arrangement of machines, an output of more than 55,000 kW could be exported to the utility net with high efficiency. Estimated investment was found to be in the neighbourhood of U.S. $8 millions.



Continuous BMA Sugar Centrifugals

for Affination and Massecuite Treatment

Its advantages are:

- No maintenance of pneumatic or electric controls
- High centrifugal efficiency
- Electric power peaks eliminated
- No foundations
- 1 operator for each station
- Minimum of spare parts
- Uniform quality and quantity of the sugar
- Three-stage curing

To date 160 continuous BMA-centrifugals are on order or have been supplied.

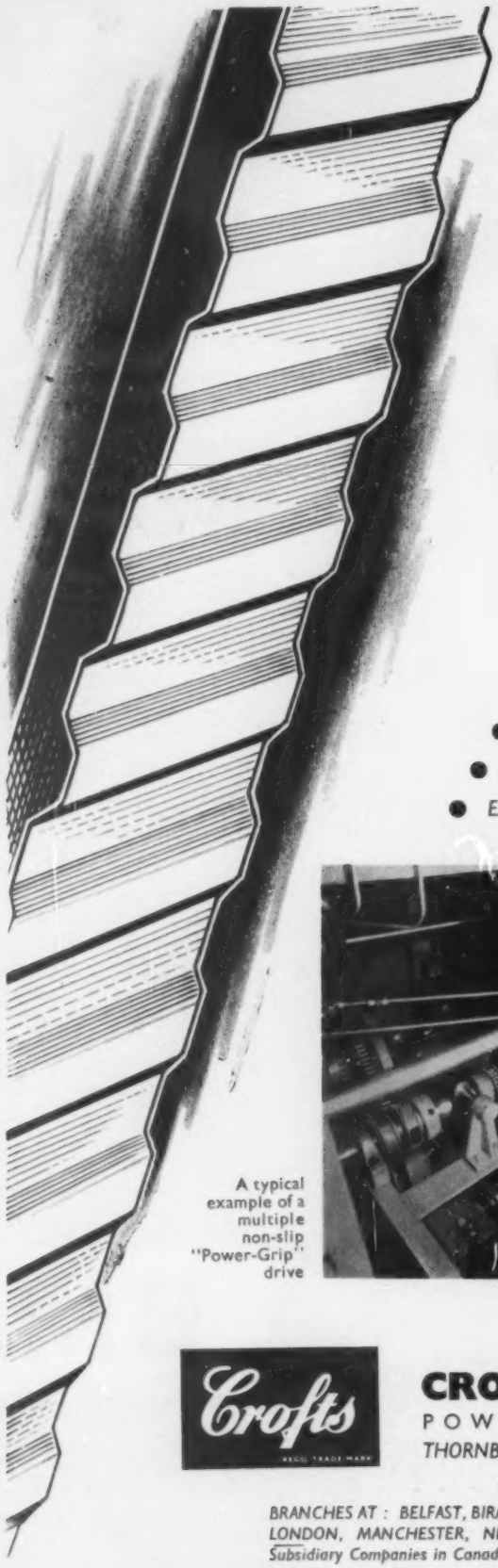
BMA

BRAUNSCHWEIGISCHE MASCHINENBAUANSTALT

BRAUNSCHWEIG · WESTERN GERMANY

BMA 140

MORE THAN 100 YEARS OF COMPLETE FACTORIES FOR · BEET SUGAR AND CANE SUGAR AS WELL AS PLANTS FOR ALCOHOL . YEAST . STARCH . TANNING AND EDIBLE OILS.

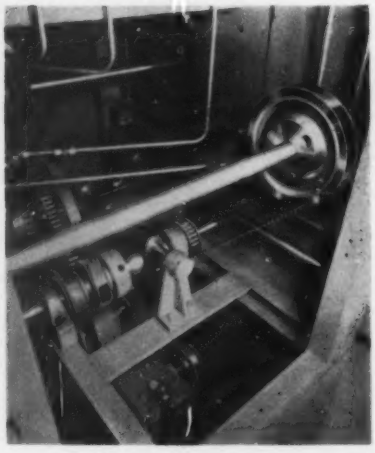


US RUBBER

PowerGrip

PRECISION BELT DRIVES EX STOCK FROM CROFTS

- *Eliminate slip or power loss.*
- *Ensure more accurate timing of synchronized drives.*
- *Dispense with tensioning devices.*
- *Suitable for slow or high speeds—from inches to over 15,000 feet per minute.*
- *Permit high-ratio drives at short centre distances.*
- *No lubrication or maintenance necessary.*
- *Easy installation with Crofts Taper-Flushbushes.*



A typical example of a multiple non-slip "Power-Grip" drive

AVAILABLE AS STOCK DRIVES

LIGHT DUTY—$\frac{3}{8}$" PITCH

HEAVY DUTY—$\frac{1}{2}$" PITCH

BOTH UP TO 64 H.P. AT 6,000 R.P.M.

BELT WIDTHS—$\frac{3}{4}$", 1", $1\frac{1}{2}$", 2", 3"

Publications 359 & 161, giving full details, including Power Tables and Notes on Selection, free on request

Crofts
REGD. TRADE MARK

CROFTS (ENGINEERS) LIMITED

POWER TRANSMISSION ENGINEERS

THORNBURY BRADFORD 3 YORKSHIRE Telephone: 65251 (20 lines)

Telegrams: "Crofters Bradford Telex" Telex 51126

BRANCHES AT : BELFAST, BIRMINGHAM, BRISTOL, CARDIFF, DUBLIN, GLASGOW, IPSWICH, LEEDS, LIVERPOOL, LONDON, MANCHESTER, NEWCASTLE, NORTHAMPTON, NOTTINGHAM, SHEFFIELD, STOKE-ON-TRENT

Subsidiary Companies in Canada, South Africa, U.S.A. World-wide representation

Service life of anion exchange resin "Amberlite IRA-401" and a new application in the refinery. T. TANAKA. *Proc. Research Soc. Japan Sugar Refineries Tech.*, 1959, **8**, 30–33.—Recovery of decolorizing capacity of the resin can be achieved by treatment with a 0·5% solution of NaOCl which oxidises the organic impurities. If such treatment is incomplete the decolorization capacity will not be fully regained while over-oxidation will reduce the ion exchange capacity by chemical action on the resin. Loading of the resins can be lowered by using bone char, ceramic filters and carbonatation in combination with the ion exchanger. The pressure drop in a column 127 cm high is about 1·2 kg/sq.cm; by decreasing this the attrition loss is also reduced. By good chemical control, i.e. standardization and simplified operation, the life of the resin may be extended to at least 600 cycles.

* * *

Studies on the utilization of the ion exchange process in sugar refining. X. An electron microscopic observation of the surface fine structure of anion exchange resin particles and its change by restoration treatments. S. IWASHINA. *Proc. Research Soc. Japan Sugar Refineries Tech.*, 1959, **8**, 34–54.—Resin samples were washed with distilled water and dried at room temperature. It was then pressed against an ethyl acrylic resin film which had been polymerized in advance on a smooth glass plate. A pressure of 1½ kg/sq.cm. caused the replication of the surface fine structure on the film which was dried at about 100°C for 1–2 min. A positive replica was made with germanium, chromium being used for metallic shadowing. The pressed surface was removed by dissolving in acetone after cutting. It was found by examination of electron micrographs of the replicas that the surface fine structure changed from roughness to denseness with an increasing proportion of divinylbenzene in the copolymer with styrene. Characteristics of the commercially available resins were all different, and their regeneration with NaOCl clearly damaged the mother structure of the resin. Examination of the resins by electron micrography after treatment up to 400 cycles was used for a comparison of regeneration with NaOCl + HCl and with HCl alone. The former gave better recovery of decolorization capacity but resulted in more broken particles, more structure damage, and greater decrease in physical strength as well as reduced ion exchange capacity compared with acid alone.

* * *

Automatic control of the magma making process. K. INAGAKI. *Proc. Research Soc. Japan Sugar Refineries Tech.*, 1959, **8**, 55–57.—The weight of raw sugar on a belt conveyor to the mingler and the flow rate of syrup are measured and the difference of their integrated values is detected, amplified and translated into air pressure which is used to operate a diaphragm control valve in the syrup line so as to maintain a constant ratio.

* * *

Effect of a steam accumulator installation in a refinery. Y. HASIMOTO. *Proc. Research Soc. Japan Sugar Refineries Tech.*, 1959, **8**, 63–73.—Installation of a steam accumulator in a refinery where there were large fluctuations of steam demand had the following beneficial effects: with constant firing, the condition in the furnace became perfect and boiler efficiency rose so that fuel costs eventually decreased; with generation at constant pressure, occurrence of interior pressure imbalance in the boiler was eliminated, so prolonging boiler life; an immediate steam supply was secured from the accumulator for peak loads and urgent supply from the boiler was eliminated; and the abundant supply of steam permitted proper operation of the refining process at full capacity and with improved product quality.

* * *

Evaporator cleaning techniques: Suggestions for a new clarification procedure for bad scaling. B. A. BOURNE and P. S. FRANCIS. *Sugar J.* (La.), 1960, **22**, (9), 17–20.—Treatment of carbonate scale in evaporators produces large quantities of CO_2 foam and it was considered advisable to assist acid circulation to produce efficient cleaning. The use of compressed air under the bottom tube plate to force acid up through the tubes was found to increase corrosion of the copper and so was discontinued. A satisfactory solution was achieved by the addition of "Nalco 71-D5," a cheap non-corrosive anti-foam agent, to the extent of 50 p.p.m. which cost about 30 cents per vessel. Because of the high lime salts content of clarified juice, experiments were carried out on the laboratory and pilot plant scale on the addition of superphosphate only to the raw juice (which had 360 p.p.m. Ca initially), followed by neutralization with ammonia. Separate experiments showed that there was less sucrose destruction when a refined sugar solution was heated with superphosphate and ammonia than with lime, both under the conditions occurring during clarification. Further trials showed the benefit of using "Separan AP-30" settling aid, and the process evolved included addition of 150–200 p.p.m. of triple superphosphate in the cold, followed by adjustment to pH 7·8 with ammonia and heating to the boil, plus the addition of 1·5 p.p.m. of "Separan AP-30" to the heated juice just as it

enters the clarifier. The pH dropped on heating to 6·7 and the clarified juice was light in colour and contained only a third of the Ca content of normally clarified juice. It settled well, and laboratory evaporation and crystallization produced 7% more sugar from juice treated by the new process compared with identical juice treated in the usual manner. Scaling should be reduced because of the lower Ca content, and the molasses, having a higher N content should be more valuable as an animal fodder ingredient.

* * *

Special bactericide shows marked savings. J. W. APPLING and M. UGARTE. *Sugar y Azúcar*, 1960, **55**, (3), 37–39.—Addition of 15 p.p.m. of "Busan 881"[1] was made to the juice leaving the last mill at Ingenio Pucalá, Peru, where compound imbibition is practised. It reduced inversion and from crusher and mixed juice glucose ratios and purities it is calculated that recovery of an extra 2861 kg of commercial sugar may be effected from the daily 3200 m. tons of cane. This would represent a value almost four times the cost of the "Busan 881."

* * *

Evaporator explosions: why they happened, how to prevent them. A. G. KELLER. *Sugar J.*, (La.) 1960, **22**, (10), 7–8.—Explosions occurring in two different evaporators are discussed and possible causes suggested. In one case, a triple effect evaporator was being tested for leaks by filling with water from a stagnant pond. The explosion may have been due to excess water pressure when the supply was not turned off, or to ignition of methane from the water. In the second case, the cast iron evaporator had been boiled-out with sodium carbonate and was undergoing a second cleaning with dilute acid, which was left in the evaporator overnight. The explosion occurred when a welding arc was struck for closing of a leak in the vapour line above the 3rd effect, and was probably caused by ignition of pure hydrogen (produced by acid attack on the iron), the flame from which reached a hydrogen-air mixture. It is recommended that all evaporators should have safety valves or rupture discs of a capacity sufficient to handle normal steam or water excess, and to maintain adequate ventilation during acid cleaning and allow no naked lights.

* * *

Notes on the defecation of cane juice. R. CASAS S. *Bol. Azucar. Mexicano*, 1959, (Aug.), 24–25; through *S.I.A.*, 1960, **22**, Abs. 139.—Some observations on juice clarification with phosphoric acid and lime are compared with results obtained by clarification with 6 p.p.m. of "Aerofloc R-550." It was possible in the laboratory to get much better clarification with the lime-phosphoric acid treatment, although results in the factory were equal. Destruction of flocs caused by pumping of the juice may affect the results.

* * *

Decolorizing ion exchangers. VII. Factory plant for decolorizing syrup. Z. MENCL, V. VALTER and F. VÁVRA. *Listy Cukr.*, 1960, **76**, 84–90.—A detailed description, with flow diagram and illustrations, is given of the ion exchange plant installed at Škrivany refinery. It was designed to treat all the syrup used for sugar loaf production, any excess being boiled for granulated or cube sugar, with a possible view to replacing bone char filters. Each of the four columns has a capacity of 1·5 cu.m. of resin. The flow of syrup, regenerants (NaOH and NH_4Cl), and of water and juice have been made fully automatic, with audio- and visual signals, and only one operator is required to supervise from one central panel. Details of the plant's performance are to be given in a future article.

* * *

Sugar silos. K. Čiž. *Listy Cukr.*, 1960, **76**, 91–93.—The characteristics of white sugar silos are considered from the point of view of the effect on the sugar of such factors as moisture and heat. Pre-stressed concrete cylindrical silos are advocated. The sugar should have a maximum ash content of 0·01%, a moisture content of 0·02–0·03% and should be stored at 60–65 R.H. The sugar temperature should be as much below 25–30°C as possible, preferably about 5°C higher than the average ambient temperature.

* * *

Evaporator explosions. A. G. KELLER. *Paper presented to the Amer. Soc. Sugar Cane Tech.*, 1960.—See above.

* * *

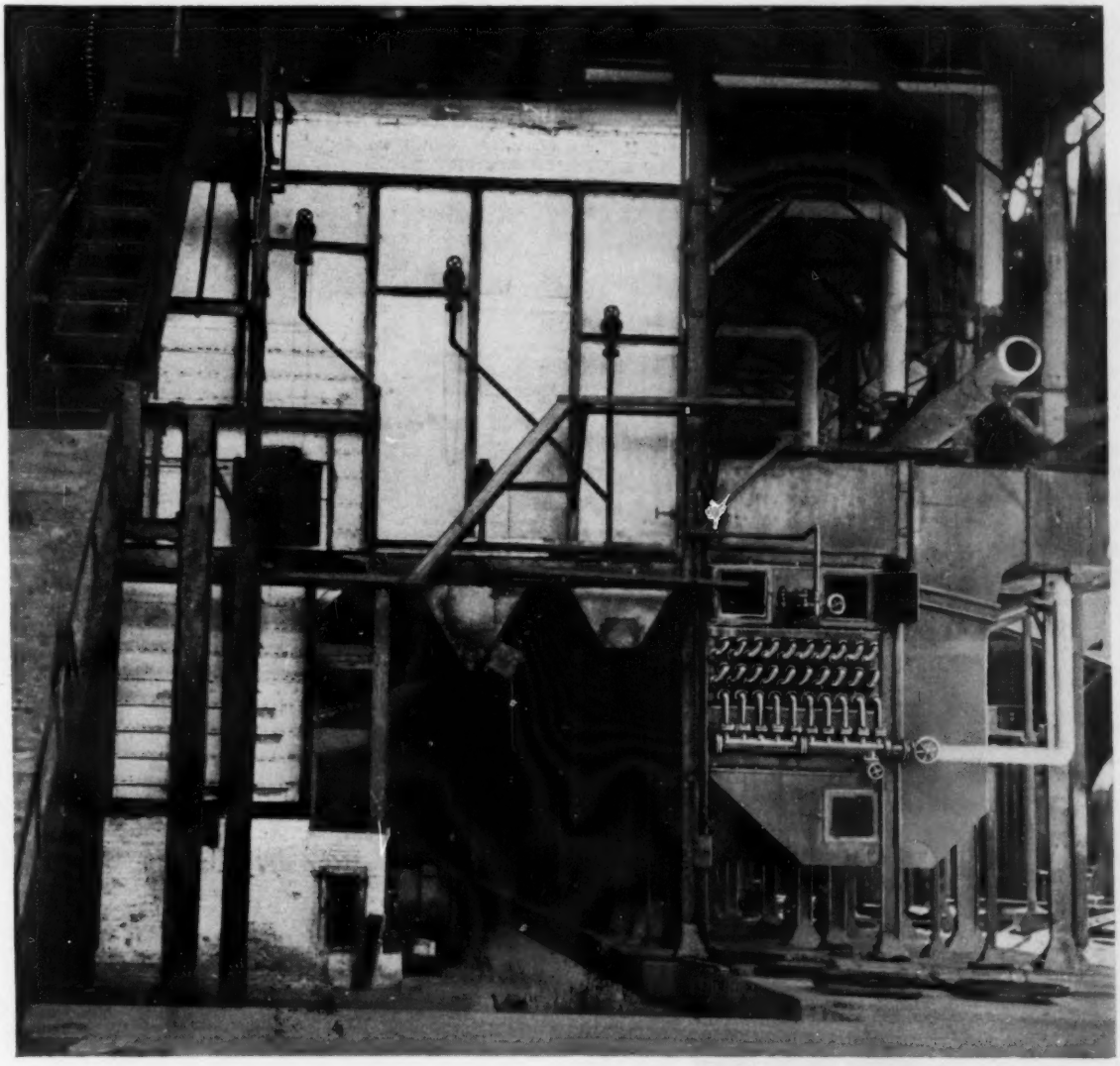
Improvement in mill engine control at Caldwell Sugar Co-operative. V. J. BAILLIET. *Paper presented to the Amer. Soc. Sugar Cane Tech.*, 1960.—To change the ratio of governor r.p.m.: flywheel r.p.m. on a Corliss engine driving the 3rd and 4th mills takes at least 10 min and causes wear on the linkages of the variation is more than 15%. The time was cut by installing a Reeves variable speed transmission between the mill engine and gearing, with which speed change is effected in a matter of seconds by turning the handwheel on the transmission. The governor operates accurately at a constant speed, hunting has been eliminated, and maintenance is restricted to cleaning and inspection.

* * *

Home-made instruments at Glenwood Co-operative. L. A. SUAREZ. *Paper presented to the Amer. Soc. Sugar Cane Tech.*, 1960.—A U-shaped tube mounted on a plywood board acts as a manometer measuring the differential pressure on either side of an orifice plate in the flow tube. It has 10–12 stainless steel pins inserted at certain set marks corresponding to various flow rates through the tube to which the manometer is connected. When the mercury column reaches a pin, an electrical circuit is completed and a bulb lit, thus indicating the flow rate of liquid. The signals are easily seen from 100–200 ft away, and the idea has been applied to level indication, whereby air is blown continuously into a tank or pond by an air pressure regulator at 2–4 p.s.i., and the air pressure in the plastic tube is registered by the mercury column, which lights more bulbs as the level rises.

[1] *See* APPLING: *I.S.J.*, 1959, **61**, 86.

More steam with a GREEN'S ECONOMISER



E. GREEN & SON LTD
WAKEFIELD, England

Makers of economisers for more than one hundred years

If you are pressed for more steam (or find the need to save supplementary fuel) a Green's Economiser installation can assist at a cost which shows a handsome dividend on the outlay.

Installed at Nicaragua Sugar Estates Ltd.

GE 192

For the production of

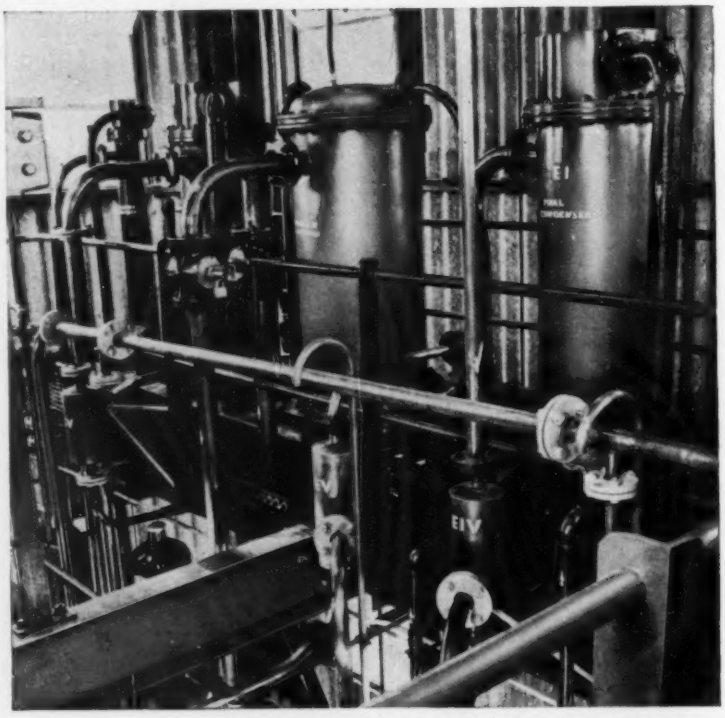
ALL TYPES OF ALCOHOL FROM YOUR MOLASSES

APV offer a complete Engineering Service

FOR ALCOHOL distillation projects, fermentation and yeast manufacturing plants, the APV Chemical Engineering Division offers a service embracing development, design, fabrication, construction and commissioning. This service extends from the building of complete plants to the provision of individual items of equipment.

Whether the raw material is molasses or rice, barley or dates, a distillation process can be offered to produce high quality alcohol with the maximum economy. As an example, an attractive distillation process has been developed which enables exceptionally fine rectified spirit to be obtained direct from molasses washes. Processes for the production of absolute alcohol with low steam consumption are also available, while another speciality is a system for the recovery of CO_2 from fermentation.

APV has had twenty-five years' experience in designing and building alcohol and yeast plants, and is served by extensive modern laboratories which make possible the thorough investigation of new materials and processes. These advantages are backed by the resources of a large, well equipped factory and by those of APV's associated companies overseas. Alcohol installations in all five continents bear witness to APV's experience in this field.



Plant for the production of highly rectified spirit direct from fermented molasses wash at Wray & Nephew Ltd., Appleton Sugar Estate, Jamaica, B.W.I.

APV

CHEMICAL ENGINEERING DIVISION

Contractors and engineers to the fermentation and alcohol distillation industries. Plants for grain cooking; saccharification; yeast culture; fermentation; CO_2 recovery; potable, industrial and rectified spirit; absolute alcohol; butyl alcohol; acetone, etc. Stills and other essential equipment for the manufacture of whisky, gin and rum.

THE A.P.V. COMPANY LIMITED · MANOR ROYAL · CRAWLEY · SUSSEX

TELEPHONE. CRAWLEY 1360 · TELEX: 8737 · TELEGRAMS: ANACLASTIC, CRAWLEY

The application of the "Eimcobelt" filter for the filtration of cane mud based on operations at the Dugas & Le Blanc Ltd. Westfield factory. C. C. SAVOIE and E. R. VRABLIK. *Paper presented to the Amer. Soc. Sugar Cane Tech.*, 1960.—Details are given of a 377 sq. ft. "Eimcobelt" rotary vacuum filter installed at Westfield in 1959 as one of the station of three rotary vacuum filters for treatment of clarifier muds. The filtrate from the two perforated metal screen filters was returned to a special small clarifier and the overflow from this sent to the evaporators. The "Eimcobelt" filtrate, however, could be sent direct to the evaporators since its clarity was about the same as that from the clarifier overflows, and its purity was 76·06 on average compared with 80·04 and 75·03 for the mill juice and filtrate clarifiers respectively. This purity would have been higher but for recirculation of the filtrate streams. Use of the "Eimcobelt" filter avoids the installation, operation and maintenance costs of a filtrate return system whereby it is limed, heated and settled in a special clarifier; further, plant shut-downs or slow-downs caused by recirculation of dirty filtrate are eliminated and sugar recovery is increased by reduction of inversion.

* * *

Standards of cane quality in relation to agronomic research and commercial evaluation of mill cane. G. ARCENAUX. *Paper presented to the Amer. Soc. Sugar Cane Tech.*, 1960.—Experience in cane quality comparative determinations has shown: that the correction factor for any given variety may be regarded as essentially constant under Louisiana conditions both for plant and ratoon cane; that 80-lb samples are adequate for milling studies provided that appropriate precautions are taken to minimise sampling errors; that the varietal fibre % cane affected the normal juice extraction and sucrose reduction factor and so the varietal correction factor, but the latter could be calculated from a control figure knowing the fibre content; and that, although the fibre contents of any given variety varies from test to test, the demonstrated constancy of the varietal correction factor shows that there will be no effect on the *differences* between varieties which it is intended to determine. The Houma system of calculation of the available sugar in cane is compared with the Australian c.c.s. formula and the S.E. formula in Réunion[1], and an account is given of its application under Louisiana conditions.

* * *

The damp-proof warehouse for sugars. ANON. *Taiwan Sugar*, 1960, **7**, (2), 23–24.—Bagged sugar stored for 4 months on a damp-proof warehouse floor composed of roof felting sandwiched between two 4-mm layers of asphalt, finally convered by concrete, showed no signs of deterioration; in a normal warehouse the sugar became moist after 2 months and molasses began to drip from the bags after 4 months. Costs of the flooring, including labour, amount to U.S.$1·50 per sq. metre. Tests also showed that it was suitable for storage of bulk sugars.

Australian milling unit at Tongaat. ANON. *S. African Sugar J.*, 1960, **44**, 219–221.—A 3-roller mill made by Walkers Ltd. of Maryborough, Queensland, has been installed as 7th mill at Tongaat Sugar Co. Ltd., Maidstone.[2] It has 38 × 84 inch rollers, and will be the first mill in South Africa to be equipped with a continuous pressure feeder. The stressed frame of the mill is triangular and the delivery roller is hydraulically loaded, so that although the top roll is fixed, the clearance can adjust itself to bagasse blanket thickness. Provision is made for the fixed feed roller to be hydraulically loaded, although this would involve the difficulty of maintaining the trash plate constantly in contact with the roller shell. The mill is driven by a 600 h.p. Brotherhood turbine operating at 4000 r.p.m. which is reduced by a gearbox and totally-enclosed gearing to 75 r.p.m. and 4·5 r.p.m. respectively.

* * *

Automatic continuous line for pressing, drying and packaging refined sugar. V. Z. SHAPRAN. *Sakhar. Prom.*, 1960, (4), 26–29.—Modifications to a Chambon continuous line are described. For automatic feeding of the sugar to the rotary press, a membrane is attached directly to the wall of the hopper at the press. This membrane is bent by the static pressure of the sugar column and actuates through a contact the starter of an electric reversing motor, which in turn causes a thrower to reduce or stop the flow of sugar to the conveyor. When the level of sugar in the hopper falls, the membrane straightens, and the flow is increased. By this means, the weight of the pressed cubes and thus of the packets is kept constant. Remote control from a central panel is possible. The dryer has been found to work well at 2·7% original moisture content of the sugar, although 1·8–2·0% is recommended by the manufacturers. With the higher moisture content, however, the crystals must be uniform and not small, and the press must be dismantled for cleaning every 15–20 days. The drum of the press is greased with a lubricating mixture of two parts of stearine and one part of a paraffin substance. To prevent individual cubes overturning on discharge from the press, owing to insufficient sugar in the matrix cells, the blocks have been altered in size to 16·65 × 17·4 × 18·2 mm. The line is very efficient and easy to operate and has replaced 114 men.

* * *

Some examples of the application of automatic control to the sugar industry. J. STREET. *Proc. 27th Conf. Queensland Soc. Sugar Cane Tech.*, 1960, 17–22.—Automatic control in the sugar factory is discussed, and in particular control of a multiple-effect evaporator, juice pH and temperature of juice leaving the heaters. The evaporator control consists of 4 separate schemes: control of liquid level, density, rate of evaporation, and automatic adjustment of the last to compensate for fluctuations in thin juice supply. The various methods of such controls are described.

[1] *I.S.J.*, 1955, **57**, 187–190.
[2] *See also I.S.J.*, 1959, **61**, 128.

BEET FACTORY NOTES

The use of phosphates in the sugar industry. F. STEINBRUNN. *Zucker*, 1960, **13**, 175–178.—The use of sodium triphosphate for boiler feed treatment (the Budenheim process), stabilizing condensate for boiler feed, softening thin juices and scale inhibition are discussed. Phosphoric acid may also be used as well as urea phosphate for boiling-out and scale removal. Ammonium diphosphate may by used as a yeast nutrient and for making boiler steam and condensate alkaline. Other phosphate compounds can also be used for water softening.

* * *

The 2nd carbonatation time cycle. A. K. KARTASHOV and YU D. GOLOVNYAK. *Sakhar. Prom.*, 1960, (3), 9–10.—The views of IVANOV & ADAMOV[1] that juice need be retained in the 2nd saturation vessel no longer than 5 min are opposed. While the reduction of alkalinity from 1st to 2nd carbonatation is somewhat rapid, the $CaCO_3$ crystallizes slowly, even at 90–96°C, and not all is removed in the muds, some remaining in the juice in the form of a supersaturated solution. Thus the shorter the retention and the lower the temperature, the greater the amount of $CaCO_3$ remaining in the juice. This amount can be as much as 170% of that in saturated solution. The supersaturated $CaCO_3$ will be deposited in the juice lines, on the filter cloths and in the evaporators. Tests show that $CaCO_3$ in the juice in supersaturated form will be precipitated if the juice is mixed with 1% $CaCO_3$ during 15 min in a vessel immersed in a boiling water bath. This effect is obtained when 2nd carbonatation juice is passed through a filter press filled with muds. Thus, to shorten the time of 2nd carbonatation is inexpedient, except where some apparatus is installed to lower the supersaturation, as in massecuite ripening.

* * *

Experiments on the use of sodium phosphate to improve boiling and massecuite centrifugalling at No. 2 Petrovsk factory. V. M. PERTSEL', I. A. ROSTRIPENKO and A. D. GOLUBEVA. *Sakhar. Prom.*, 1960, (3), 10–12.—In factory tests it was found that the addition of sodium triphosphate (3–5 kg per 100 tons of beet) to 2nd carbonatation juice inhibited scale formation in evaporators and that sulphitation to pH 7·5 improved boiling and massecuite spinning when stale beet were processed; even when poor quality beet are being processed it is inadvisable to add more than 20 kg per 100 tons of beet. The sulphitation should be to an alkalinity no lower than 0·005% CaO (phenolphthalein endpoint), to ensure that no mud passes into solution with an increase in the CaO content of the solution. Sulphitation of the syrup, without triphosphate addition, causes incrustation on the pan heating surface and increases the boiling time. The colour of the resultant yellow sugar increases considerably, despite the use of syrup for nucleation. The phosphate should be added to the control chest of the 2nd carbonatation saturation tank. After a 30 days' test, a thin greyish deposit was found in the evaporator effects. Calcium sulphate crystals were not detected by microscope in the scale, which is considered to be silicic acid since it would not dissolve in HCl or HNO_3, but was softened by boiling-out with sodium carbonate, after which it easily dissolved in HCl.

* * *

The drop in crystallization rate of sucrose in green syrup at a temperature of 90°C. P. V. GOLOVIN, M. A. ABRAMOVA and A. A. GERASIMENKO. *Sakhar. Prom.*, 1960, (3), 13–15.—The drop in crystallization rate of sucrose in green syrup detected between 80°C and 90°C in laboratory tests[2] is attributed to the effect of an increase in the non-sugars:water ratio at constant purity (79·28) with increasing dry solids content, e.g. 0·83 at 80% and 1·52 at 88%.

* * *

Calculation of the additional sugar yield obtained by reducing molasses purity. I. N. AKINDINOV. *Sakhar. Prom.*, 1960, (3), 15–16.—The amount of sugar obtained from molasses on 100 kg of beet is given by $\frac{M_1(R_1NP_2)}{100}$, where M_1 = molasses yield per 100 kg beet, R_1 = dry solids content of molasses, N = non-sugars content, and P_2 = melassegenic coefficient (= reduced purity/100 — reduced purity).

* * *

Disinfection of battery diffusers with formalin. G. V. SHTEPAN. *Sakhar. Prom.*, 1960, (3), 16–17.—See PAVLAS *et al. Listy Cukr.*, 1959, **75**, 180–188; *I.S.J.*, 1960, **62**, 47.

* * *

The use of jet mills in the sugar industry. Z. D. ZHURAVLEVA and A. M. ZHURAVLEV. *Sakhar. Prom.*, 1960, (3), 17–20.—Details and diagrams are given of the Blaw-Knox[3] and "Micronizer"[4] jet-vibratory pulverizers used for size reduction, e.g. of limestone to 3·5μ.

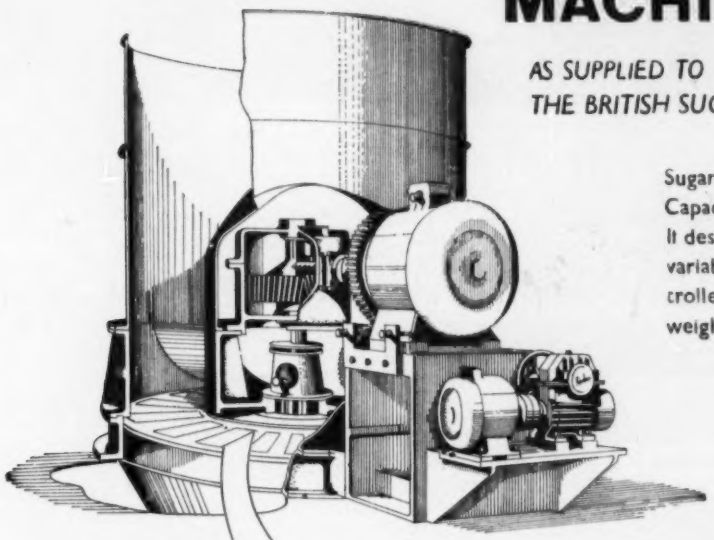
* * *

The effect of composition of water, used for diffusion, on the quality of the products. G. S. BENIN and V. I. GORDIENKO. *Sakhar. Prom.*, 1960, (3), 21–27.—The water from various rivers and artesian wells used in 16 sugar factories of Krasnodar Territory was analyzed and details are given of the mineral content, with graphs demonstrating the changes in the chemical composition of one river in the regions of two different factories. Comparative diffusion tests using distilled and raw river water showed that the former gave a syrup purity 1·8 units higher than the latter, although the untreated water was considered of good quality as regards the mineral content.

[1] *Sakhar Prom.*, 1959, (6), 1–4.
[2] *See I.S.J.*, 1959, **61**, 283.
[3] Blaw-Knox Co., Pittsburgh, Pa., U.S.A.
[4] Sturtevant Mill Company, Boston, Mass., U.S.A.

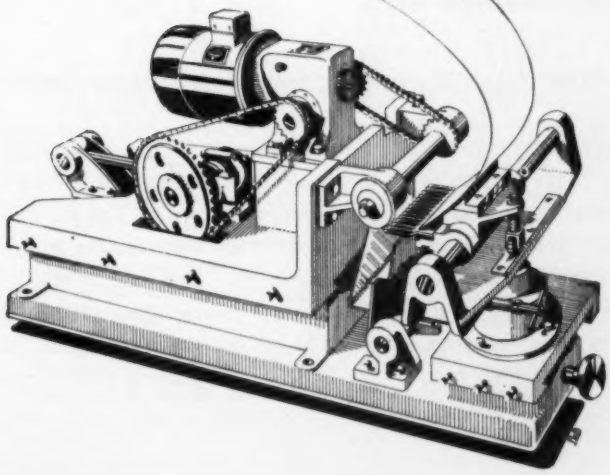
BEET SLICING
and
AUTOMATIC KNIFE SHARPENING MACHINES

AS SUPPLIED TO
THE BRITISH SUGAR CORPORATION LTD



Sugar Beet Slicing Machine. Capacity 1,200 tons/24 hrs. If desired can be fitted with variable speed drive controlled by cossette band weigher.

Automatic Knife Sharpening Machine for coarse and fine sharpening.



COCKSEDGE & Co. LTD

Telephone
Ipswich 56161 (5 lines)

IPSWICH ENGLAND

Telegrams
Cocksedge, Ipswich

RUTHS STEAM ACCUMULATOR
FOR FLACQ UNITED ESTATES SUGAR FACTORY, MAURITIUS
MADE BY COCHRAN & Co. ANNAN Ltd. SCOTLAND
CAMIONAGE MAXIME CAYEUX

One of the two Ruths Accumulators supplied to Mauritius

This steam user proved that

STEAM STORAGE

increased factory efficiency and production

As part of an expansion scheme Flacq United Estates Sugar Factory of Mauritius installed two Ruths Accumulators with the result that the existing boiler plant became capable of supplying steam at a steady pressure to the greatly increased process consumers. In addition the increased production is going on with improved efficiency.

The customer states ". . . it is beyond any doubt that the two accumulators . . . have to a very considerable extent helped in attaining this remarkable achievement".

Cochran, the makers of Ruths Steam accumulators, are glad to supply schemes to solve factory steam problems, and invite you to avail yourself of their experienced technical service.

RUTHS
Regd. Trade Mark

STEAM ACCUMULATORS

COCHRAN & COMPANY, ANNAN, LIMITED, 34 Victoria Street, London, S.W.1. Abbey 4441 and at ANNAN, DUMFRIESSHIRE, SCOTLAND. Annan 111

TAS/CH 680

Cleaning evaporator heating surfaces. I. S. KARCHEVSKII. *Sakhar. Prom.*, 1960, (3), 28–31.—The boiling-out of evaporators with sodium carbonate and HCl is discussed and suggestions are offered on the best means to achieve maximum effect, bearing in mind the limited time available for the operation.

* * *

A saving in fuel used for pulp drying. L. I. SHAPIRO. *Sakhar. Prom.*, 1960, (3), 31–32.—By using boiler waste gases together with the gases from the furnace of a pulp dryer, it is possible to reduce the fuel requirements. Calculations are presented, based on a Büttner drum dryer.

* * *

Improving the quality of manufactured equipment. A. V. GONCHARENKO. *Sakhar. Prom.*, 1960, (3), 34–35.—Defects discovered in newly-manufactured equipment are discussed and recommendations made as to the best method of rectifying the faults. Case-hardening is advocated for working parts of such pieces of equipment as those used for beet fluming and washing, and pulleys and spindles in elevator chains.

* * *

Some constructional defects in equipment. I. F. YAMKOVOI. *Sakhar. Prom.*, 1960, (3), 35–37.—Faults in some of the equipment at Sablino-Znamensk factory are discussed.

* * *

Accelerating the settling of 1st carbonatation juice by adding polyacrylamide. B. S. ZHALOV. *Sakhar. Prom.*, 1960, (3), 38–39.—Comparative laboratory tests were carried out in which 1 c.c. of 0·25% solution of polyacrylamide was added to 200 c.c. of limed juice after its saturation to 0·19% CaO alkalinity and heating to 100°C. During the first 5 min of the subsequent settling, mud heights were 3 and 8·5 cm with and without addition respectively, the supernatant liquid to which the polyacrylamide had been added being absolutely transparent and sparkling, whereas the other juice was turbid and contained fine particles which would not settle. In another test 200 c.c. of raw juice was limed with 1·8% CaO and aliquots saturated to different alkalinities, before 0·75 c.c. polyacrylamide was added. At 0·14% CaO alkalinity, the untreated juice would not settle, while the treated sample yielded a completely transparent juice. Optimal settling rate increase was achieved at 0·12% CaO alkalinity and 0·4 c.c. polyacrylamide per 200 c.c. juice.

* * *

Some modifications at Karabulaksk sugar factory. V. N. TRET'YAKOV. *Sakhar. Prom.*, 1960, (3), 42–44.—The quadruple effect evaporator has been successfully boiled-out with sodium carbonate and NaOH according to the method used at Ramonsk factory[1] and this method is recommended for all sugar factories. Certain modifications made to the Raud stone-trap are discussed.

Transporting carbonatation muds. K. SKALSKI. *Gaz. Cukr.*, 1960, **62**, 66–68.—Methods of transporting undiluted muds are discussed, in particular the Büttner-Werke pneumatic device[2] and the Hoelscher inclined-rotor pump.

* * *

Possible applications for centrifugals. T. KOWALCZYK. *Gaz. Cukr.*, 1960, **62**, 62–65.—The use of Krauss-Maffei and Alfa-Laval centrifuges and centrifugal separators for juice purification, pulp drying, and removing colloids from diffusion water, is discussed with numerous diagrams.

* * *

A rapid method of determining the effect of low-product massecuite crystallization. K. WAGNEROWSKI, D. DABROWSKA and C. DABROWSKI. *Gaz. Cukr.*, 1960, **62**, 69–70.—The crystallization effect, sucrose solubility in molasses and undetermined losses are determined from graphs drawn up expressing the relationship between molasses Brix and non-sugars concentration at specific viscosities. The molasses is mixed in a glass vessel, immersed in an ultrathermostat, by a mixer rotating at 20 r.p.m. In the final phase of saturation, the crystal content is about 25–30%, and the higher values of saturation coefficient are attained within 120 min. The complete determination takes 4 hr. Graphs and nomograms are presented relating the various parameters (molasses Brix, purity, temperature and non-sugars concentration).

* * *

The mechanization of sugar beet reloading in Holland, Austria and Switzerland. K. PEISKER. *Zucker*, 1960, **13**, 197–205.—An illustrated review of the unloading and reloading equipment in these countries.

* * *

Protection of concrete against the action of sugar. M. VON MILDENSTEIN. *Zucker*, 1960, **13**, 205–208.—Tests were carried out in which coats of potassium water-glass, fluosilicate and "Perfalon-L-extra" (a double-component epoxy resin) were applied to concrete. Unlike the "Perfalon", the two inorganic substances did not seal the pores sufficiently and some decrease in the compression strength of the concrete was observed. The "Perfalon" was superior in corrosion prevention and is recommended particularly for concrete silos, despite its higher cost.

* * *

The question of molasses evaluation. M. v. LILLIENSKIOLD. *Zucker*, 1960, **13**, 208–209.—The following criteria for beet molasses evaluation are suggested: a minimum Brix of 76·5°; a minimum of 47% pol, with a reduction of 2% of the selling price per 1% pol sugar below this value; a minimum pH of 7·0 ± 0·1 (electrometric); a maximum sulphurous acid content of 0·15%, the SO_2 being determined by distillation and iodine titration; an invert sugar content of 2%; and all analyses to be carried out with 1:1 diluted molasses.

[1] STASEV & TYAZHELOVA: *I.S.J.*, 1960, **62**, 104.
[2] *See* SCHÖNBERG: *I.S.J.*, 1959, **61**, 374.

Corrosion in the sugar industry. E. LECLERC, T. SAMUEL, J. HISSEL, H. GOLDSTEIN, A. DE LAMOTTE, P. NAVEZ, R. DEGREZ, J. SPRINGUEL and A. CAMBRESIER. *Sucr. Belge*, 1960, **79**, 293–305.—An investigation into the corrosion of tubes and tube-plates in sugar refinery equipment has been carried out and details are presented of laboratory and plant tests with the conclusions drawn. It was noted that, on replacement after 20 years of the tubes of a calandria pan with a sloping bottom plate, there was no corrosion at all on the steam side of the tubes, although the inside surface was worn. On the other hand, in spite of using the same vapours, calandrias with flat bottoms have to be partially retubed after 3 years' service, their tubes being perforated by corrosion just above their junction with the bottom tube plate. Examination of samples of the vapour and gas in contact with the steel tubes of a Kestner evaporator second body showed that neither could be considered harmful and, in fact, corrosion was absent over two campaigns. Laboratory tests showed that galvanic corrosion between steel of different hardness could not be ruled out, although the results were variable and indecisive. Plant trials using test-pieces of steel inserted in vessels during and after the campaign were carried out, two of these involving treatment with milk-of-lime and an inhibitor (morpholine), respectively. During the campaign, corrosion was slight, but in the inter-crop period it was severe, and was unhibited by morpholine or lime. Further laboratory trials with test-pieces in contact with distilled water alone and containing lime to pH 9·5, lime to pH 12·4, NaOH to pH 9·5 and 5 g/litre of sodium tripolyphosphate (at pH 9·0) showed that only the lime to pH 12·4 and the polyphosphate prevented corrosion. Samples were also exposed to the atmospheres in sealed containers above the liquids mentioned; after 350 hours the oxygen content of the atmospheres was measured; only above the lime water of pH 12·4 was there no oxygen uptake, which had occurred above the polyphosphate solution although no corrosion was apparent. The other samples were corroded as when in free air.

* * *

Properties and processing value of sugar beet. K. VUKOV. *Cukoripari Kutatóintézet Közleményei*, 1959, **4**, 35–42; through *S.I.A.*, 1960, **22**, Abs. 246.—The processing value of beets depends on the sugar content and factory losses. Losses in the flume depend on the extent of damaged surfaces on the beet. Diffusion losses depend on the uniformity of cossettes (affected by the slicing of forked beets), the slicing resistance, and the diffusion constant (which depends on temperature). Unknown losses may arise by invertase action, connected with the wilting of beet. Values of sugar in molasses (estimated by Silin's method) and of purities and ash in beets and molasses are also required for estimating the quality of the beets. The various types of losses are discussed in detail, and the likelihood of improvement in beet varieties is also considered.

The development of waste water purification plants in sugar factories in Brunswick. H. LIMPRICH. *Zeitsch. Zuckerind.*, 1960, **85**, 179–183.—The development of waste-water purification plants in Brunswick administrative region from the 1870's to recent years is reviewed. Difficulties are encountered at some factories which do not have any land to irrigate, and the question of complete water return and waste water purification remains open for these.

* * *

Methods of notation and procedure in sugar technological calculations. H. LAUCKE. *Zeitsch. Zuckerind.*, 1960, **85**, 74–81, 117–123, 184–192.—The methods and nomenclature used in sugar technology calculations are discussed (92 references to the literature) and compared with those used in physics. A nomenclature is presented, which would be suitable for international use, and basic relationships expressed in terms of this nomenclature.

* * *

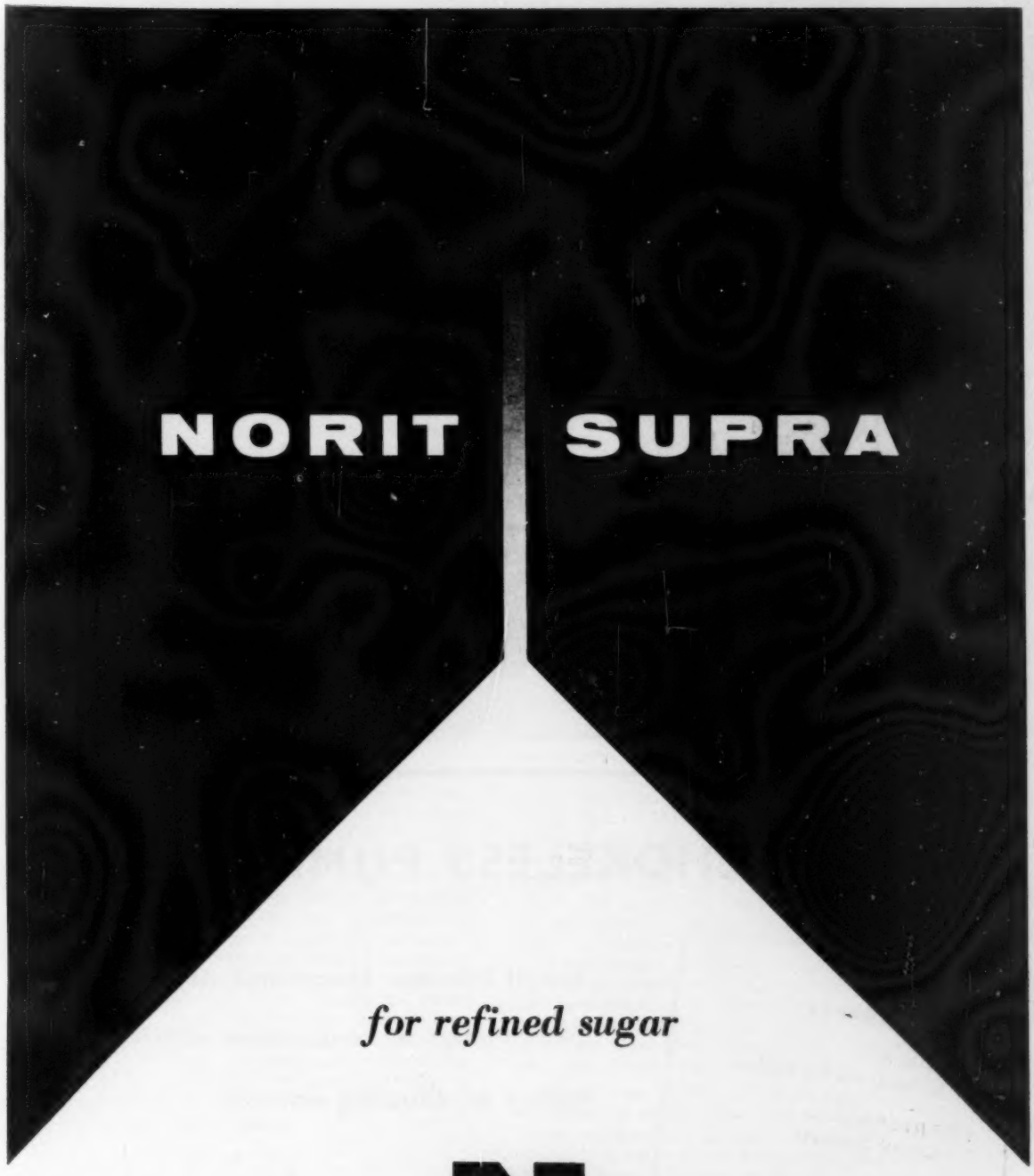
New pH Meters with glass electrodes. W. HEIMKE. *Zeitsch. Zuckerind.*, 1960, **85**, 198–200.—Two new pH meters are described and illustrated. One includes a continuous flow vessel which prevents formation of dead space in which lime could be deposited, while the other includes a self-cleaning electrode, designed for preliming and carbonatation, where deposits are left by the juices on the electrodes.

* * *

Performance of the RT diffuser in the 1959/60 campaign. H. J. FISCHER. *Zuckererzeugung*, 1960, **4**, 122–125.—Unsatisfactory diffusion results at Rossleben during the first half of October were attributed to the abnormal condition of the beet after the very dry summer. Total losses during the period were 0·32% on beet at 118% juice draught. The speed of the drum had to be cut to ensure continuous processing, when the beet input was reduced. However, stoppages did occur, leading to a rise in bacterial infection and a fall in the raw juice purity. This was countered successfully by dosing with formalin, which prevented the pH falling below 4·6. Another factor responsible for the unsatisfactory campaign results was the boiler fuel, described as "generally more dust than coal".

* * *

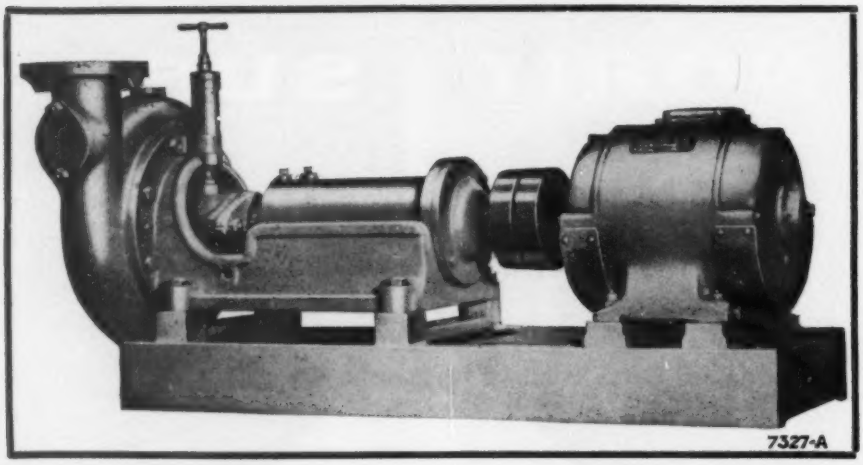
Complete return of dissolved low-product sugar. ANON. *Zuckererzeugung*, 1960, **4**, 139.—Details are given of the production scheme at Benkendorf factory, which operates a 2-strike system, in which the low-product sugar is melted in thin juice to give a clear liquor of 45° Brix and 92·8 purity, which is subjected to main liming and mixed with muddy juice. There is no change in the molasses purity compared with the results when only part of the low-product sugar is melted. There is a drop in the throughput of beet when the low-product sugar is dissolved, owing to increased demands on the various stations working to full capacity, and this is to be the subject of further studies, together with the economics.



UNITED NORIT SALES CORPORATION LTD - AMSTERDAM - HOLLAND

Streamline

MILL IMBIBITION PROCESS



MIRRLEES CHOKELESS PUMPS

Recent installations:

VENEZUELA—
El Palmar and Rio Turbio;

PUERTO RICO—
Central Guanica;

CUBA—
Palma; Ermita, Providencia;

BRITISH WEST INDIES—
Basse Terre, Antigua, Corozal, Richmond, Rosehall, Hampden;

DOMINICAN REPUBLIC—
Boya, La Romana.

Install Mirrlees Unstrained Return Juice Pumps in conjunction with scraper, rotary or vibrating screens.

★

Full information on request:

MIRRLEES WATSON COMPANY LIMITED

Head Office and Works: SCOTLAND STREET, GLASGOW, C5.
London Office: 38 Grosvenor Gardens, S.W.1.

New Books and Bulletins

Reports on the Progress of Applied Chemistry. Vol. XLIII: 1958. 911 pp; 5½ × 8¼ in. (Society of Chemical Industry, 14 Belgrave Square, London S.W.1.) 1959. Price: 100s. 0d. (to non-members).

The latest of the "Applied Reports" follows the same pattern as in previous volumes[1], covering the sections Fuel and Fuel Products; Organic Chemistry; Inorganic Chemistry; Metals; Biological Products; Textiles, Plastics, Paints, etc.; Chemical Engineering and Hazards; and Agriculture and Food. The last has a subsection "Food", including an account of developments recorded during 1958 in the field of sugars. This is by Dr. H. M. THOMPSON, of Tate & Lyle Research Laboratories, and covers the 1958 literature on cane sugar, beet sugar, analysis, and crystallization. There are 26 references, some of them multiple, as well as a supplementary bibliography.

* * *

An Introduction to Industrial Mycology, 5th Edition. G. SMITH. 399 pp; 5½ × 8½ in. (Edward Arnold (Publishers) Ltd., 41 Maddox St., London W.1.) 1960. Price: 40s 0d.

For those with little or no training in botany, perhaps faced for the first time with a mould problem, this book provides an adequate source of knowledge in simple terms with a large number of photomicrographs and descriptions of the more common and important moulds. The first three chapters are an introduction, followed by discussions of general morphology and classification, and nomenclature. Following this the next seven chapters, each with its own bibliography, describing various classes of fungi. A chapter is devoted to laboratory equipment and technique, while four more consider the physiology of mould fungi, maintenance of a culture collection, the control of mould growth, and the industrial uses of fungi. A final chapter provides a classified review of mycological literature, while an appendix deals with microscopy. The work concludes with author and subject indices.

* * *

F. O. Licht's Internationales Zuckerwirtschaftliches Jahr- und Adressbuch 1959/60. (International Sugar Economic Year Book and Directory 1959/60.) H. AHLFELD. 410 pp + 60 pp; 8½ × 11⅛ in. (F. O. Licht K.G., P.O. Box 90, Ratzeburg, Schleswig-Holstein, Germany.) 1960. Price: DM 30.00; 55s. 6d.

The latest edition of this indispensable work of reference includes certain slight modifications, but is basically the same as previous editions. As regards Germany itself, the terms of delivery and payment for sugar factories and importers of consumption sugar have been omitted, as have the address of the Sugar and Confectionery Section of the Federal Department of Food, Agriculture and Forestry and addresses of the various sections of the Office for Sugar Imports. A new section has been included giving details of the German sugar and beet research institutes, and a new address of Professional Organizations of the Sugar Trade (A.S.S.U.C.) with its headquarters in Brussels. The atlas this year is devoted to Cuba and Pakistan, while the comprehensive directory of sugar factories and refineries is continued as before, with amendments and additions to bring it up to date.

* * *

Some Effects of the Sugar Programs on the Sugar Industry of Puerto Rico. JOSÉ B. CANDELAS. 46 pp; 6×9 in. (University of Puerto Rico Agricultural Experiment Station, Río Pedras, Puerto Rico). 1959.

Bulletin 151 of the Río Pedras Experiment Station is concerned with agriculture in that it records the effect on the sugar producers in Puerto Rico of the U.S. Government's legislation following the first Sugar Act of 1934. To do this, a brief appraisal is given of the industry and the factors which affect its economics and efficiency, due importance being attached to the peculiar conditions of under-employment and consequent social influence on the degree of mechanization in Puerto Rico as compared with the U.S. Mainland and Hawaii. The history of American sugar policy is reviewed from 1789 and the quota system introduced in 1934 is discussed together with an assessment of the likely situation had the Sugar Act not been passed; it is considered that there would probably have been uncontrolled sugar surpluses and that prices would have been generally lower.

The powers of the U.S. Secretary of Agriculture to maintain stable prices and adequate supplies of sugar are described and the effect of the higher and stable U.S. sugar prices and benefit payments on the Puerto Rican planters economics discussed. With the increased and increasing costs of cane cultivation, growers have in recent years had net losses as a result of their operations, and the benefit payments have enabled them to stay in business. The refined sugar quota assigned in 1934 has been unchanged since and it is considered that expansion of refining operations which would be permitted by enlargement of the quota would help the industry considerably.

[1] Cf. *I.S.J.*, 159, **61**, 149.

Determination of reducing sugar by use of the "redoxokinetic effect." M. ANDO. *Proc. Research Soc. Japan Sugar Refineries Tech.*, 1959, **8**, 88–91.—With coloured sugar or molasses, it is difficult to see the end-point of a Lane & Eynon titration to determine the reducing sugar present. Where these conditions occur it has been found possible to follow the titration by means of the redoxokinetic effect[1] whereby two platinum electrodes in the solution are connected by a source of 50–100 mV a.c. A sudden voltage fluctuation occurs at the end-point. The electrodes should be cleaned with 20% HCl just before use.

* * *

Formation of conglomerates of sugar crystals. M. KAMODA and T. YAMANE. *Proc. Research Soc. Soc. Japan Sugar Refineries Tech.*, 1959, **8**, 122–130.—The effect of a number of variables on conglomerate formation was studied in a series of laboratory experiments. The number of conglomerates increased with decrease in the supersaturation of the syrup when seeding and decreased with stirring up to a certain point after which no further decrease occurred. Conglomerates increased markedly with rising temperature, increasing seed density and decreasing crystal size, while they became fewer on addition of fructose, raffinose, monosodium glutamate and sodium glycolate. "Separan 2610" and glucose increased conglomerate formation, the latter however having an effect reducing at higher concentration. Conglomerate formation became marked as crystallization velocity increased, except where the stirring speed was increased.

* * *

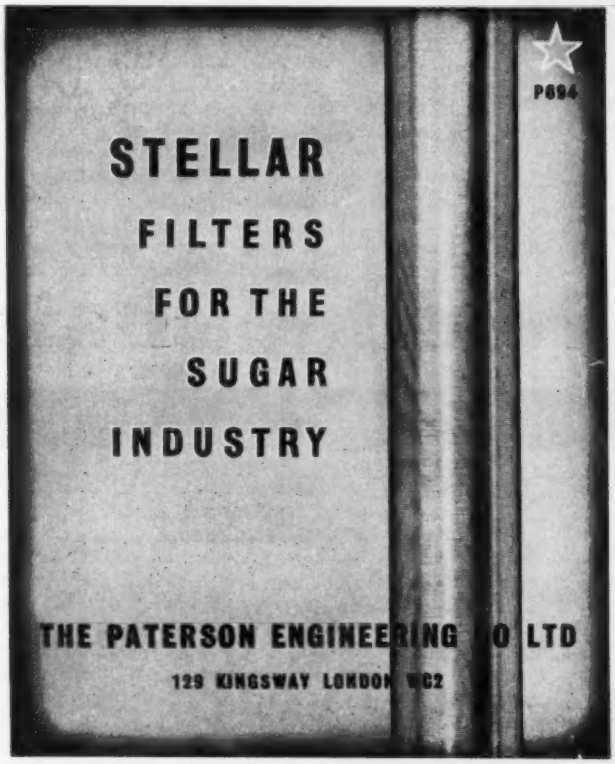
Photoelectric automatic polarimeters. A. EMMERICH. *Zucker*, 1960, **13**, 148–153.—While the standard type of polarimeter as used in the sugar industry for some years is equipped with a sodium vapour lamp as light source, the modern automatic polarimeters use a mercury vapour lamp. The wavelength of the mercury light is 5461 A compared with 5892·5 A of the sodium light. The mercury green light has an advantage in that its most intensive emission occurs in the visible spectrum and that with suitable lamp and filters it is reproduced easily and very accurately. However, tests have shown that the mercury light gives an angular rotation of a 100° quartz plate somewhat different from that given by the sodium light, e.g. 40·960° compared with 34·620° at 20°C. The value given by the sodium light is almost identical with the rotation values for normal sugar solution given by BATES (in this case 34·617°), whereas the mercury light value for a normal solution differs from that of the quartz plate by (40·763—40·690°), i.e. 0·18% difference. Thus, where the standard quartz plates and compensation wedges are used, the reading from the photoelectric polarimeter will be 0·18% too high, or where the scale has been graduated for 5461 A, the quartz plates will give a value 0·18% too low. The readings given by the photoelectric polarimeters do not, therefore, comply with the ICUMSA International Sugar Scale. Tests on raw sugar and beet molasses were carried out, and (i) the ratio 5461 A : 5892·5 A, and (ii) the reading at 5461 A as a percentage of the ISS value were calculated. The average ratio was 1·17810 and the average percentage 100·065. Three automatic polarimeters were tested: the Zeiss[2], Hilger & Watts[3] and the E.T.L.-N.P.L.,[4] produced by Ericsson Telephones Ltd. The Zeiss instrument gave a null point constant of ± 0·025°S during 1 day, and of ± 0·15°S over 3 months. Darkness of the sugar solution had no effect on the reading. The quartz control plates reproduce to within ± 0·05°S; an average constant deviation of ± 0·033°S was found. Accuracy was to within ± 0·036°S. The Hilger & Watts polarimeter gave quartz plate readings constant ± 0·05°S over 24 hr, and ± 0·15°S over 1 week. Dark sugar solutions offer no difficulties, and readings are accurate within ± 0·05°S. The E.T.L.-N.P.L. instrument was not so easily tested, as it is very sensitive with a range of 0·5° of arc, and there were no quartz plates of such a small angle. The scale base must be adjusted with a potentiometer. Readings were to within ± 0·02°S over a short period of time. After 1 hour's warming-up the null point stayed constant for 1 day at ± 0·02°S, although a shorter warming-up time causes the null point to fluctuate.

* * *

Colour chart for the determination of whiteness value of sugar from reflectances at 450 and 560 mμ. S. DEVANARAYANA. *Proc. Research Soc. Japan Sugar Refineries Tech.*, 1959, **8**, 131–138.—A series of charts are presented in which the lines of equal "whiteness value" as characterized by the reflectance ratio $\frac{\text{Refl}_{450}}{\text{Refl}_{560} - \text{Refl}_{450}}$, are drawn for varying values of Refl_{450} and Refl_{560}. The charts save calculation of the reflectance ratio and conversion by the scale of KAMODA & YAMANE[5] to "whiteness value."

[1] DOSS and NARAYANAN: *J. Soc. Anal. Chem.*, 1958, **83**, 696–8; *Electrochem. Acta*, 1959, **1**, 22–25.
[2] See *I.S.J.*, 1960, **62**, 24.
[3] See *I.S.J.*, 1960, **62**, 98.
[4] See *I.S.J.*, 1959, **61**, 231.
[5] *Proc. Research Soc. Japan Sugar Refineries Tech.*, 1955, **4**, 91; *I.S.J.*, 1957, **59**, 24.

YOU MUST SEE THIS



It's the *new* booklet about a new filtration technique . . . STELLAR. In its pages are described and pictured the functions of Stellar Filters in the clarification and polishing of sugar syrups. You'll find it well worth reading. May we send you a free copy?

Write: Stellar Department
Paterson Engineering Co. Ltd.
129, Kingsway, London, W.C.2

Through the mill . .

from cane or beet to refined sugar production runs smoother on . .

TOUGH MALLEABLE IRON—LONG WEARING
INTERCHANGEABLE WITH OTHER MAKES

Pennine chain

Catalogues on request: PENNINE CHAINBELT CO. LTD., ARMLEY, LEEDS 12, ENGLAND

A Suma Product

The CUTEX CANE DISINTEGRATOR

FEATURES

Specially designed for effecting the extremely fine disintegration of sugar cane for rapid sucrose and fibre determinations.
A most effective and robust machine. Inexpensive.

ADVANTAGES

Guaranteed to give results in accordance with the requirements of international methods. Can be driven by belt from countershaft or from motor (at about 1500 revs. per min.). Teeth cut in solid cylinder of special steel.

The Sugar Manufacturers' Supply Co. Ltd.
7 & 8, IDOL LANE, LONDON, E.C.3, ENGLAND.
Cables: "Sumasuco, London."

Studies of the rate of sucrose solution in aqueous electrolytes. F. SCHNEIDER, A. EMMERICH and K. JÖRN. *Zucker-Beihefte*, 1960, **4**, 1–11.—The rates at which sucrose crystals dissolve in electrolytes were studied at 20°C. A review is also given of the literature with 86 references. A theoretical equation is developed for calculation of the solution rate of sucrose, which is defined as the change in activity of the sucrose per unit time. Allowance is made for variations in crystal surfaces by a correction factor. The solution rate constant K_a is independent of undersaturation and tests at various agitator speeds have shown that under given conditions the diffusion of the sucrose molecule in the solution is not the major rate-determining factor. In the presence of inorganic salts of ion strength up to 2M there was no change in the value of the rate constant, while at higher concentrations a significant drop was observed. With univalent ions the size of the ion radius affected the results. Additions of monopotassium glutamate and the potassium salt of pyrrolidone carboxylic acid caused sharp drops in the solution rate. The possibility of using the results of the tests in studies of the crystallization rate is discussed.

* * *

Group separation of the constituents of beet molasses with ion exchangers. F. SCHNEIDER, E. REINEFELD, F. AMDING and B. ZENKER. *Zucker-Beihefte*, 1960, **4**, 11-18.—Tests were carried out on the separation of molasses into N, anion, cation and neutral fractions by treatment with three different synthetic anion and cation exchange resins Details are tabulated of the N, K, and Cl contents of the fractions as a % of the total content in the molasses. All of the exchangers were suitable for group separation of the constituents, the "Amberlite" resins being preferred for as complete separation as possible, and recovery of the individual non-sugar fractions. Details are given of the procedures used for separation into the various fractions. The N-fraction was only approximately evaluated. In the cation fraction K, Na, Ca, and Cl, carbonate and hydroxide were determined quantitatively, and the cation and anion equivalents calculated. The ratio of Na:K corresponded to that of the original molasses within experimental error, whereas the Ca:K ratio was somewhat lower. The analytical data are in close agreement with those of the original molasses. The anion fraction, containing mostly organic acids, primarily pyrrolidone carboxylic acid and lactic acid, also contained about 20% of the total N of the molasses. This was reduced to 3·3% after acid hydrolysis, the removed portion being mainly glutamic acid. The "neutral" fraction contained sugars (raffinose, invert and kestose) and pectins, hemicellulose as well as arabinose and galactose, i.e. including those substances which because of their molecular size pass through both exchangers. Molasses containing a known quantity of salt was calcined and the ash determined. From this was calculated the conversion factor for determination of the actual salts content, which at 1·9 confirms the finding of ŠANDERA[1]. Twenty-six references to the literature are given.

The inversion of sucrose on acid ion exchangers. A. EMMERICH and G. SCHACHTEN. *Zucker-Beihefte*, 1960, **4**, 19–25.—The inversion of sucrose by ion exchangers is discussed, with 23 references to the literature, and particularly the interaction of inversion and diffusion on the basis of tests with strongly and weakly acid polystyrene exchange resins. The tests were conducted on three resins at two different sucrose concentrations (15 and 20 g/100 ml). The concentration was found to have no offect on the rate constant. The value of the rate constant k (0·06) was found to be lower by a factor of 27 than the rate constant for homogeneous reactions in which the same amount of H ions are in the form of HCl. This indicates the retarding effect of inversion as the sucrose molecule must reach the catalytically active H ions by diffusion. The constant increased with temperature, the effect of which on inversion was considerably greater in the weakly acid than in the strongly acid resins. The rate constant was lower the greater the size of the particular particles. In salt solutions the inversion constants increased sharply with addition of salts, an increase in the inversion rate being caused by pH reduction. The reaction constants were found to be additive for hetrogeneous plus homogeneous reactions in the salt solutions. The resin was found to have no catalytic effect on inversion, and past references in the literature to any such effect must be a result of incomplete H^+ ion removal.

* * *

Ion exchangers in sugar analysis. II. Technological calculations using inorganic salts concentration. J. BURIÁNEK and D. ŠLECHTOVÁ. *Listy Cukr.*, 1960, **76**, 53–56.—The 'R' ratio, defined for a specific sugar solution as *p:An*, where p = pol and An = inorganic salts concentration in meq/100 g, determined by means of strongly basic ion exchangers on the OH^- cycle, is recommended for factory calculations. Using this ratio, it is possible to determine the proportions of sucrose crystals and mother liquor in a massecuite. For this, the appropriate equations are

$$s_k = 100\,\frac{R_o - R_r}{R_o}$$

where s_k = total weight of sucrose in crystal form, R_o = ratio for crystals plus mother liquor after dissolving, and R_r = ratio for mother syrup removed from the mixture; and

$$s_r = 100\,\frac{R_r}{R_o}$$

where s_r = total weight of sucrose in the mother syrup. These can be used to determine the effects of boiling and crystallization, to evaluate laboratory crystallization tests and to calculate the sugar in molasses.

* * *

Formation of conglomerates of sugar crystals. K. KAMODA and T. YAMANE. *Ind. Sacc. Ital.*, 1960, **53**, 1–8.—See *I.S.J.*, 1960, **62**, 155.

[1] *Zeitsch. Zuckerind. Tschechosl. Rep.*, 1928/29, **53**, 1.

Ebullioscopic method of determining reducing sugars. V. K. NIZOVKIN and I. Z. EMEL'YANOVA. *Zhurn. Priklad. Khim.*, **32**, 2516–2521.—A technique is described whereby reducing sugars are determined chemically using a reagent obtained by mixing 5 ml each of (A) 10 g $CuSO_4.5H_2O$ and 0·04 g methylene blue in 1 litre of water and (B) 50 g Rochelle salts, 75 g NaOH and 5 g potassium ferrocyanide in 1 litre of water. The titration is carried out in a special apparatus designed to exclude atmospheric oxygen from the reaction and to provide easy temperature regulation and avoid local overheating. A conical flask has a stopper through which pass a vent to atmosphere, provided with a rubber valve, and the neck of a second flask in which the reagents are placed with some boiling water. A tube runs down inside from the top of the body of the second flask to below the level of the reagents inside. Water in the first flask is brought to the boil and the rubber valve closed, whereupon steam is driven through the side tube and so into the reagent mixture, heating and agitating it. A burette fitted with a stopper at its delivery end is fitted into the top of the neck of the second flask, just above a small hole which permits excess steam to escape during the titration. About 90% of the sugar solution required is added and the remainder dropwise to an endpoint where the colour changes from violet to yellow.

* * *

Rate of growth of sucrose crystals. G. H. DE VRIES. *Sugar y Azúcar*, 1960, **55**, (4), 37.—The Grut formula[1] relating viscosity and supersaturation is used to derive the value of the linear growth velocity constant from the author's equation[2], at supersaturations greater than 1·10. The calculated values of k range from 0·0028 to 0·0035 and the author takes an approximate mean of 0·003 whereby his equation for the supersaturation range 1·10–1·20 reduces to:

$$v = 0{\cdot}003\,\frac{(C - C_0)^2}{\eta}$$

where v = linear crystallization rate in μ/min, C = concentration of crystallization solution in g sucrose/100 kg water, C_0 = amount of sucrose per 100 water in a saturated solution at the same temperature, and η = viscosity of mother liquor in poises.

* * *

Non-sugars in factory juices with special reference to effective alkalinity. R. CAROLAN. *Research Laboratory Rpt.* (Irish Sugar Co. Ltd.), 1960, (41), 36 pp.—In order to determine the reasons for low effective alkalinities experienced in Irish juices, a series of detailed analyses of juices have been carried out using methods many of which closely follow those of CARRUTHERS *et al.*[3] Certain factors affecting the effective alkalinity have been considered which were not taken into account by these authors. A comparison of the British and Irish analyses is presented in tabular form and the differences are discussed; the higher lime salts of the Irish juices is largely due to the lower phosphate and citrate content of the raw juice, partly offset by their lower magnesium content, and to the higher glutamine content. Excessive loss of alkalinity in the evaporators is due also to the same causes; the bicarbonate content of the Irish juices was low owing to the high glutamine content coupled with the deficit of phosphate and citrate and the resultant small CO_2 loss in evaporation was insufficient to compensate for the alkalinity loss as ammonia on degradation of glutamine. Details are given of the analytical techniques used including an appendix describing the citric estimation method.

* * *

Rapid determination of moisture in pressed sugar beet pulp. A. E. GOOBAN, T. JAOUNI and R. M. MCCREADY. *J. Amer. Soc. Sugar Beet Tech.*, 1959, **10**, 478–480.—The moisture content of pressed pulp may be determined from the dichromate consumed in oxidizing a given amount of the dry material in the sample. 25 ml of 1·835 N potassium dichromate is added to a weighed sample, calculated to reduce no more than 80% of the dichromate, and 30 ml conc. H_2SO_4 added with magnetic stirring. The reagent mixture is then diluted with 150 ml of water and the excess dichromate titrated electrometrically with ferrous ammonium sulphate. The moisture % is given by $100\,(1 - FD)$, where F = g of dry material per ml dichromate, and D = ml dichromate per g of wet sample. For various materials, including glucose, sucrose, pulp, potatoes, prunes, rice and corn, the value of F covers a range of only 11%, from 0·01247 g per ml 1·835 N dichromate to 0·01285 g. For beet pulp, F is 0·01302 with a standard deviation of 0·0004 over 4–6 replicates. An error of 1% in the solids determination of a pulp of 90% moisture means an error of only 0·1% moisture content, so that the higher the water content the more accurate the moisture determination. Accuracy is of the same order as given by vacuum oven desiccation, and the method takes 10 min after weighing, or 4 min per sample for a series, instead of several hours.

* * *

Effects of storage on raffinose content of sugar beets. I. Varietal changes occurring during storage. R. E. FINKNER, D. M. FINKNER and R. F. OLSON. *J. Amer. Soc. Sugar Beet Tech.*, 1959, **10**, 481–488.—In an investigation on stored beet, it was found that the raffinose content of topped beet stored in the root cellar for 9 weeks increased significantly with storage from about 0·3 to 0·5% on dry substance, although after 3 weeks no differences were found between the contents of these beet and piled beet. The ranking of the varieties as regards raffinose content remained unaltered.

[1] DE BRUYN: Principles of Sugar Technology. Vol. II. Ed. P. Honig. (Elsevier, Amsterdam.) 1959. p. 457.
[2] *Chem. Weekblad*, 1935, **32**, 361–6; *I.S.J.*, 1935, **37**, 449.
[3] *I.S.J.*, 1959, **61**, 376.

UNITED KINGDOM

Beet harvester. N. A. CHRISTIANSEN, of Tommerup, Denmark. **832,165.** 6th October 1958; 6th April 1960.

* * *

Beet topper (feeler wheels). MASSEY-FERGUSON (GREAT BRITAIN) LTD., of Manchester, England. **832,845.** 17th September 1958; 13th April 1960.

* * *

Purification of crude sugar solutions. INVENTA A.G. FÜR FORSCHUNG U. PATENTVERWENDUNG, of Lucerne, Switzerland. **834,988.** 18th August 1958; 18th May 1960.—The solution is treated with a solid water-insoluble metal oxide (α-ferric oxide or manganese dioxide) at a temperature of 50–100°C; impurities are absorbed whereupon the oxide is separated from the sugar solution and regenerated by heating to 200–220°C.

* * *

Mechanical handling of articles such as packets of sugar and other substances. BRECKNELL, DOLMAN & ROGERS LTD. and H. J. DOLMAN, of Bristol. **835,239.** 22nd March 1957; 18th May 1960.

* * *

Beet thinners. (1) C. VAN DER LELY N.V., of Maasland, Holland. **835,654.** 11th March 1958; 25th May 1960. (2) LANDBOUWWERKTUIGEN EN MACHINEFABRIEK H. VISSERS N.V., of Nieuw-Vennep, Holland. **835,677.** 13th October 1958; 25th May 1960.

* * *

Centrifugals. SOC. DES RAFFINERIES & SUCRERIES SAY, of Paris, France. **836,224.** 19th February 1957; 1st June 1960.—See U.S.P. 2,894,634[1].

* * *

Refining sugar solutions. FARBENFABRIK BAYER A.G., of Leverkusen-Bayerwerk, Germany. **836,473.** 23rd September 1957; 1st June 1960.—After crystallization of sugar from a thick juice, the mother-liquor run-off is treated by a combined desalting (by ion exchangers) and decolorizing process so as to raise its purity to at least 93, whereupon it is either subjected to a second crystallization, desalting and decolorization or mixed with fresh thin juice or thick juice or another batch of treated run-off and the cycle repeated.

* * *

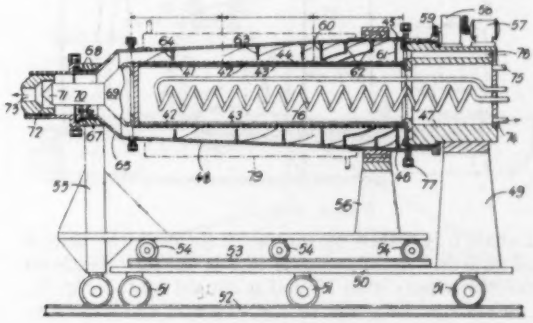
Fibres and filaments from dextran derivatives. COMMONWEALTH ENGINEERING CO. OF OHIO, of Dayton, Ohio, U.S.A. **836,907.** 21st March 1957; 9th June 1960.—A suitable plasticizer is incorporated into an ester, ether or ether-ester of dextran, a stabilizer and size are added and the mass extruded through a small opening while heating the mass, thereby producing a fibre or filament.

* * *

Multitray clarifier. DORR-OLIVER INC., of Stamford, Conn., U.S.A. **837,595.** 13th April 1956; 15th June 1960.—See U.S.P. 2,889,927[2].

* * *

Continuous filter press. E. GORIOT, of Le Vesinet (Seine et Oise), France. **837,780.** 23rd July 1957; 15th June 1960.—The filter press comprises an inner cylinder 41 having radial perforations 42 covered by a filter cloth 44. The cylinder has a flanged end 45 secured by bolts 46 to a cylindrical body 47 supported by frame 49. Its bed 50 also carries a rail 53 on which frame 55-56 can move by means of wheels 54. This second frame carries an outer tapered casing



48 for the press fastened by bolts 77 to a flanged sleeve outside the cylindrical body 47 but separated from it by suitable packing. The outer casing is rotated by motor 57 through gearing 58 and pinion 59. The inside of the casing 48 carries helical fins 61, 62, 63 and 64 which are located in three sections, the blades in each section becoming fewer and of smaller pitch in the direction of cake discharge (right to left in the drawing). The smaller end of the casing 48 is mounted in a housing 67 with suitable packing 68 and connected to the housing 72 for the cake exit pipe 73. A suitably shaped body is fitted onto the end of cylinder 41 and extends into the exit so that movement of the housing 72 can shut

[1] *I.S.J.*, 1959, **61**, 380.
[2] *I.S.J.*, 1959, **61**, 348.

Copies of Specifications of United Kingdom Patents can be obtained on application to H.M. Patent Office, 25 Southampton Buildings, London, W.C.2. (price 3s. 6d. each). United States patent specifications are obtainable from: The Commissioner of Patents, Washington, D.C. (price 25 cents each).

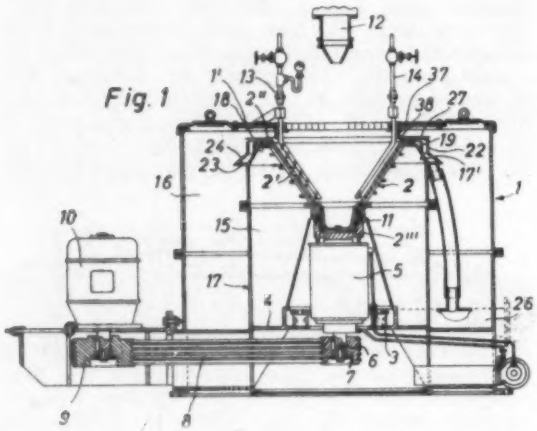
off cake discharge if required. The material to be filtered is pumped through pipe 78 into the space between the casing 48 and cylinder 41. Filtrate collecting inside the cylinder may be withdrawn through pipe 74 or, if this is closed, through pipe 75, in which case it can be heated, if desired, by passing suitable heating medium through the coil 76. Alternatively, the outer casing 48 may be provided with a heating jacket 79.

* * *

Beet loader. AB. OVERUMS BRUK, of Overum, Sweden. **837,882.** 27th June 1956; 15th June 1960.

* * *

Centrifugals. HEIN, LEHMANN & CO. A.G., of Düsseldorf, Germany. **838,049.** 26th November 1958; 22nd June 1960.—In the continuous centrifugal illustrated, the frustroconical drum 2 is mounted in a bearing 5 supported by rubber cushions 3 on frame 4.



Its shaft 6 is driven by motor 10 through the belts 8 and pulleys 7 and 9. Massecuite is fed into the drum from the supply inlet 12 and is caught by the cup 11. It passes up the walls of the cup and onto the perforated surface 2′ of the drum. Sugar separating is carried up by centrifugal force, is washed by means of the pipes 13 and 14, and passes through a gap between the vertical cylindrical plate 38 and the annular horizontal plate 27 into the sugar-receiving chamber 16. Molasses passing through the perforations is collected in chamber 15. Molasses which creeps up the inside of the partition 17 between chamber 15 and 16 is not able to contaminate the purged sugar because it passes through the gap 18 between partition and drum and is trapped by ring 19. This has holes 20 in it which permit the molasses chamber 26 connected with chamber 15. Any molasses flung beyond ring 19 by the drum 2 is caught by the solid ring 22 and is similarly collected in chamber 24.

* * *

Process for producing aqueous alcohol from impure dilute aqueous solutions thereof. USINES DE MELLE, of Melle (Deux-Sèvres), France. **839,423.** 2nd October 1958; 29th June 1960.—Impure dilute aqueous alcohol is subjected to extractive distillation in a first column provided at its head with a hot water decanter. From the lower part of the column is withdrawn an aqueous alcoholic solution containing residual impurities. This is distilled in a second column to yield a concentrated aqueous alcohol (at least 90% w./w.). from the top and an aqueous residue which is returned to the water decanter at the top of the first column. The concentrated alcohol is subjected to a second extractive distillation in a third column provided with a water decanter, yielding a dilute alcohol from its foot which is redistilled in a fourth column to give a concentrated alcohol from the head and an aqueous residue from the foot which is returned to the water decanter of the third extraction column. The impurities/alcohol mixture vapour from the head of the third column is withdrawn and used to heat a fifth column in which the purified concentrated alcohol is separated from any methanol; when condensed it is returned to the top of the first column. Similarly the alcohol/impurities from the top of the first column is distilled and the residue also returned to the top of the first columm.

* * *

UNITED STATES

Ion exchange purification process (for beet juices). G. ASSALINI, assr. ROHM & HAAS CO., of Philadelphia, Pa., U.S.A. (A) **2,929,745.** 19th July 1957; 22nd March 1960. (B) **2,929,746.** 2nd June 1959; 22nd March, 1960.

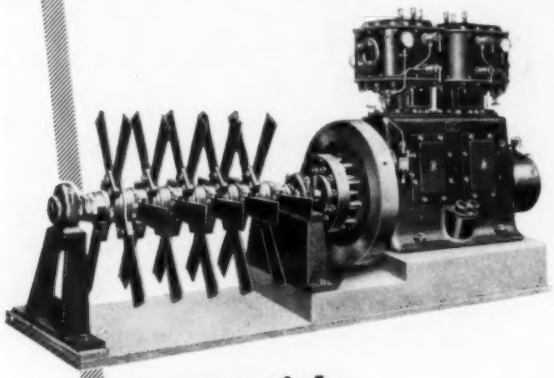
(A) Sugar juices (or molasses diluted with 50% by weight of water and treated with cationic and anionic resins) are treated at least at room temperature with an ion exchange resin in hydroxide form whereby the salts present are converted into the corresponding hydroxides. The juices are then treated with a water-soluble metal salt (of iron, managnese or aluminium; aluminium sulphate) yielding an insoluble hydroxide, with resultant coagulation of organic non-sugars. The juice is then treated with a strongly basic anionic resin in basic form and subsequently with a weakly acidic cationic resin in hydrogen form.

(B) The initial strongly basic anion exchanger of the specification above may be part of a mixed bed so arranged that the effluent juice is in the hydroxide form, and this is treated with either calcium sulphate or calcium chloride and the insoluble salts removed. Subsequently the juice is treated with strongly basic anionic and weakly acidic cationic resins either in succession or as a mixed bed.

* * *

Production of pulp from bagasse. E. L. POWELL, assr. BROWN & ROOT INC., of Houston, Texas, U.S.A. **2,932,600.** 25th February 1953; 12th April 1960.—Bagasse is agitated and treated with steam at 100–125 p.s.i. for 30–60 min, the pressure rapidly relieved to ½ or less of the original pressure (50–60 p.s.i.), a 2–3% caustic solution added in the proportion of 5 parts solution to 1 part bagasse w./w., and the bagasse agitated and cooked with live steam at 100–125 p.s.i. for a further 30–60 min.

PARKER Steam Engines



provide economical power for the Sugar Industry

In factories and refineries throughout the world PARKER steam engines are providing reliable power from process steam at negligible cost. Simple and efficient in design, Parker engines require little maintenance and can be operated by unskilled labour. Unlike turbines Parker engines can be direct coupled without the use of costly reduction gearing and variable speed over wide limits can be obtained without complicated control equipment.

Built in sizes from 10 *to* 1,000 *b.h.p. PARKER engines are all constructed to give long life with top economy under the most severe operating conditions.*

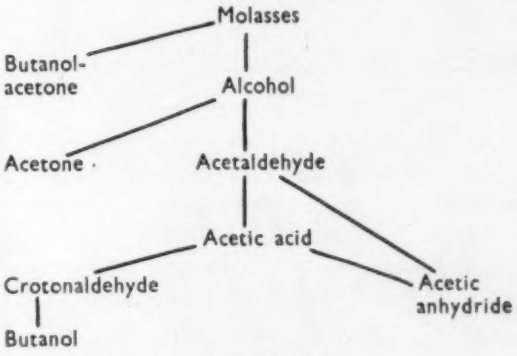
Write now for full specifications and applications to:

ASHWORTH & PARKER LTD

RIVERSIDE WORKS · BURY · LANCS.

IMPROVED DISTILLATION EQUIPMENT

FERMENTATION AND BYPRODUCTS INDUSTRIES



Ancillary industries :
Yeast and glucose manufacture

Planning
Projects and Engineering
Construction
Erection
Initial operation

SPEICHIM

Société pour l'Equipement des Industries Chimiques

14 rue la Boétie

PARIS 8 ème FRANCE

A Suma Product

PANOSCOPE
(PAN-MICROSCOPE)

The graining point can now be *watched* through our PANOSCOPE pan microscope. A special 16 mm. objective is now available which will give a ×170 magnification with full extension of the draw tube. The pansman will then use the standard ×65 magnification for checking false grain formation and measure the final crystal size with the ×20 eyepiece.

The
Sugar Manufacturers' Supply Co. Ltd.
7 & 8, IDOL LANE, LONDON, E.C.3
(*Cable Address* : Sumasuco-London)

We have sold our patented
SUGAR TABLET OR CUBE INSTALLATIONS
all over the world.

Cubes from dry granulated

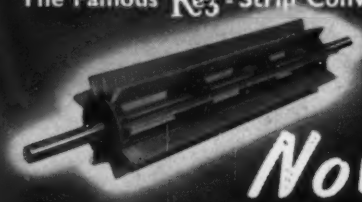
The small machine with the big output!

Automatic packing equipment if desired

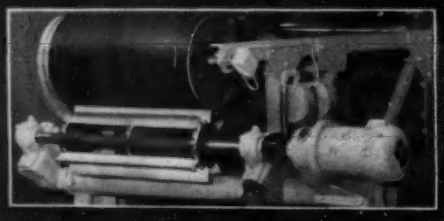
Very low capital outlay

Send for information to:
GOKA N.V.
MACHINE WORKS
Established 21 years
AMSTERDAM
HOLLAND
P.O. Box No. 130
Tel: 222255–222256
Telex: 14173 "Kagodam"

The Famous Kez-Strip Conveyor Belt Brush



Now-
complete in combination with our K·A·M UNIT
Prov. Pat. No. 33781 Regd. Trade Mark 761901



Showing the Unit in position ready for action. Micro-adjustable. Flameproof. Anti-static features can be incorporated. Little, if any, guarding required.

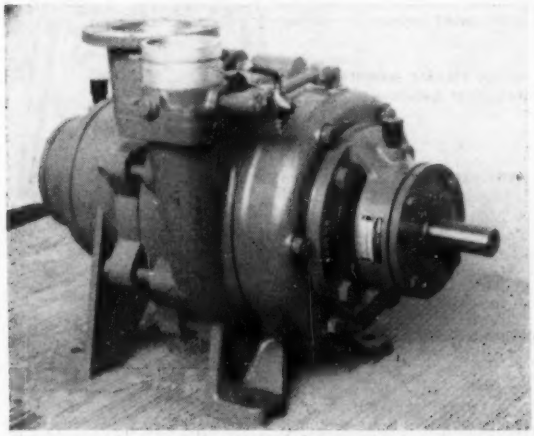
INDUSTRIAL DIVISION
THE Kleen-e-ze BRUSH CO. LTD
83 BEVAN LANE, HANHAM, BRISTOL

TRADE NOTICES

Statements published under this heading are based on information supplied by the firm or individual concerned. Literature can generally be obtained on request from the address given.

Sihi pumps. Siemen & Hinsch m.b.H., Itzehoe/Holstein, Germany.

More than a million "Sihi" pumps have been delivered in the forty years of existence of the manufacturer. The current range includes self-priming and non-self-priming centrifugal pumps and liquid-ring vacuum pumps and compressors. The self-priming centrifugal pumps up to 600 litres/min capacity employ the "lateral channel" principle, while those over 600 and up to 4500 litres/min are a combination of a centrifugal pump for liquids coupled in parallel with a special air-ventilation pump stage, of the lateral channel type, which effects the self-priming. A special construction is the compact self-priming pump illustrated. The non-self-priming centrifugal pumps are constructed in various stages and can achieve capacities up to about 4500 litres/min. Where space reduction is essential, the pumps are available as vertical or monobloc designs.



The liquid ring "Sihi" pumps are of three main types—for medium vacuum (60 cm mercury), high vacuum (25 torr) and for compression up to 6 atm gauge. These vacuum pumps and compressors are designed for high capacity—up to 60 cu.m./min—and are particularly suited to sugar plant operation.

* * *

Bulk sugar carrier for Westburn Refinery. Bonallack & Sons Ltd., Basildon, Essex.

A new vehicle designed for the bulk carriage and low pressure pneumatic discharge of sugar to overhead storage has recently been completed for Westburn Sugar Refineries Ltd. of Greenock. The load is carried in three separate light alloy hoppers each with a volumetric capacity of 5 tons, pressurised to 10 p.s.i. and mounted in tandem. A positive displacement blower mounted behind the tractor cab and driven by a power take-off from its gearbox supplies 600 cu.ft./min of filtered air at a maximum pressure of 10 p.s.i. which discharges the sugar through a single manifold running beneath the length of the trailer and coupled by flexible large-bore hose to the storage tank intake. Teleflex controls on a side-mounted

panel operate butterfly valves in the hopper discharge ports and in the air supply pipe, while further valves control the supply of air to the tops of the hoppers. Thus hoppers may be unloaded individually as required. In preliminary tests the sugar has been discharged over a total distance of 110 ft—75 ft vertically and 35 ft horizontally—at a rate of 25 tons/hr. Lubrication of the vehicle is carried out automatically by the Tecalemit "Syndromic" system. Only one man is required to drive and operate the carrier.

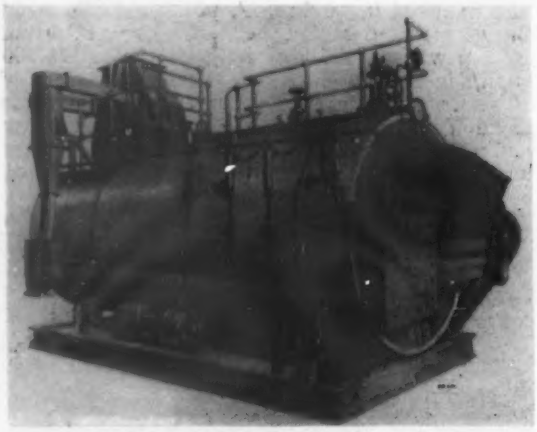
* * *

Rotary discharge valve. Dunford & Elliott Process Engineering Ltd., Linford St., London S.W.8.

A new design of rotary discharge valve for hoppers, bins, etc., achieves compactness by mounting of a reduction gearbox to form one end cover of the valve body, so eliminating couplings or chain drives. A 9-inch diameter four-bladed rotor is carried on the drive shaft of the gear unit, revolving on a longitudinal axis. It is fully shrouded and positively sealed, and carries adjustable sealing and wearing strips. The horizontal valve body has 8-inch square inlet and outlet flanges and is manufactured in cast iron or stainless steel. The valve is available in two sizes: a single type of 100 cu.ft./hr capacity and a duplex type of 200 cu.ft./hr.

New "CoalPak" boiler. Davey, Paxman & Co. Ltd., Standard Ironworks, Colchester, Essex.

The new "CoalPak" coal-fired packaged boiler is mounted on its own base and can be seated as a complete unit with the minimum of foundation and



installation work. There are eight sizes in the range with overall lengths of $17\frac{1}{2} - 21\frac{1}{2}$ ft and outputs of 2000 – 8500 lb/hr of steam from and at 212°F. It is mechanically fired, the stoker and induced draught fans control being modulated according to steam demand. Automatic coal feeding to the stoker hopper can be added by provision of a suitable elevator, and adequate safety controls are provided.

* * *

PUBLICATIONS RECEIVED

COMMANDER FLOW MEASURING INSTRUMENTS. George Kent Ltd., Luton, Beds.

Publication 988, of January 1960, is a summary of the specifications of the mercurial KU series of flow recorders, indicators, integrators, controllers and transmitters for water, steam, oil, air, etc., and also provides information on orifice plates and fittings, Venturi tubes, "Dall" tubes and orifices and pitot tubes.

* * *

MIRRLEES SUGAR CANE MILLS RECENTLY INSTALLED. The Mirrlees Watson Co. Ltd., 45 Scotland Street, Glasgow, C.5.

Since 1945, Mirrlees cane mills and drives have been installed in a considerable number of plants as is illustrated by the list of factories which gives dates, size and number of units and the type of drive employed. A number of photographs of these installations are given with further information. It is interesting to note that between 1945 and 1949 the new drives were steam engines while from 1950 to 1955 some were steam engines and some steam turbines. Since 1956 all the new drives installed have been steam turbines.

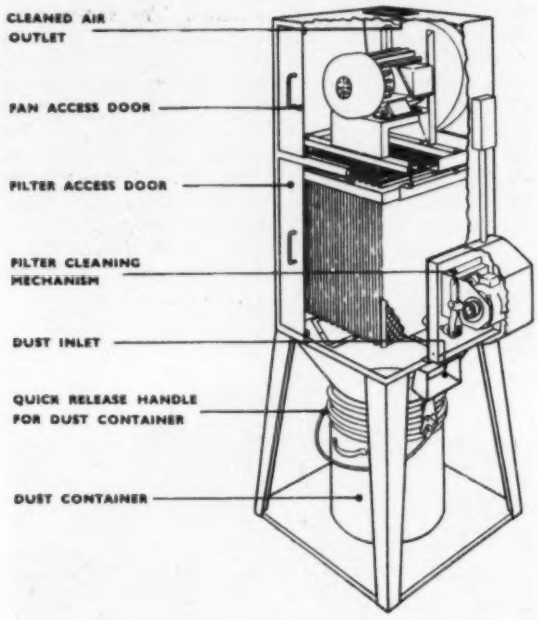
* * *

THE PURPLE PEEPER. Honeywell Controls Ltd., Ruislip Road East, Greenford, Middx.

Under this rather lurid title is published a leaflet describing a new piece of equipment sensitive only to ultra-violet radiation which is designed to discriminate between flame and hot refractory and is used to respond to flame failure within 0·1 second, cutting off fuel supply, e.g. to an oil-fired furnace. It is easily installed and removed and can be arranged to supervise both pilot and main jet.

Dust collector. Dallow Lambert & Co. Ltd., Thurmaston, Leicester.

For dust removal where mixing, filling, pneumatic conveying, weighing, screening, drying, mechanical handling, etc., are carried out, Dallow Lambert have introduced their new "Unimaster" equipment illustrated. This is a completely self-contained collector which is very compact, has a built-in fan with greater capacity than previous designs, an improved fabric filter element, an efficient "air cushion" filter cleaner



operated either by push-button control or automatically, and a quick-release gear for removal of the dust container, while a range of dust containers is available, the inspection doors provide easy access to the fan, motor and filter, and the unit can be connected to ducting serving a number of locations.

* * *

PRIMARY ELEMENTS FOR TEMPERATURE MEASUREMENT. George Kent Ltd., Luton, Beds.

Publication 349 of March 1960 gives details of the Kent range of resistance thermometers, thermocouples and radiation pyrometers, with descriptions, dimensions, and typical applications.

* * *

"POLY-V" DRIVES. Turner Brothers Asbestos Co. Ltd. Rochdale, Lancashire.

Bulletin BPV.3 gives engineering data on service factors, horsepower ratings, pulleys and installation and maintenance instructions for the new "POLY-V" power transmission drive which uses belting having a flat outer surface and an inner surface with a zig-zag section fitting into the grooves on the special pulleys employed.

Brazil Sugar Exports [1]

Metric tons, tel quel

Destination	1956	1957	1958	1959
Argentina	0	0	15,074	0
Belgium	0	0	0	22,473
Bolivia	258	426	1,070	356
Ceylon	4,150	12,340	74,864	117,070
Chile	0	20,225	55,648	12,967
China (Mainland)	0	0	99,431	0
Egypt	0	55,412	10,426	0
Eire	0	0	0	29,768
Finland	0	17,294	10,552	0
France	0	9,002	70,282	70,540
French West Africa	0	0	0	1,200
Iceland	0	2,045	0	0
Iraq	0	3,369	0	0
Israel	0	15,332	31,595	16,305
Italy	0	0	68,007	6,050
Japan	0	10,630	89,528	65,813
Jordan	0	0	0	3,556
Malaya	0	0	1,021	0
Morocco	0	19,499	39,865	30,975
Netherlands	0	12,763	35,895	8,541
Pakistan	0	16,847	0	0
Portugal	0	15,997	16,336	11,385
Spain	0	27,837	10,210	6,209
Sudan	0	0	27,072	9,515
Sweden	0	0	8,577	0
Tunisia	0	0	0	17,363
United Kingdom	4,429	139,788	54,216	81,048
Uruguay	14,544	30,148	56,140	80,176
U.S.A.	0	0	0	10,465
Total	23,381	408,954	775,809	601,775

BREVITIES

Sugar production in El Salvador[2].—According to recent estimates of the Ministry of Agriculture, sugar production for the 1959/60 season, which is harvested between November and February, will be 47,640 metric tons. If this estimate proves to be correct, this will be a record crop; production in the 1958/59 period, the second largest on record, was 46,460 metric tons.

* * *

Argentina mill modernization eased[3].—Sugar mill machinery and related spare parts and accessories of a type not produced in Argentina are exempted from import surcharges by Argentine decree No. 1234 of 28th January 1960. Argentina's sugar industry is burdened by antiquated and outdated machinery, thereby contributing to sugar production costs higher than in many producing countries. The decree is designed to facilitate the acquisition of needed equipment and to contribute to the industry's modernization.

* * *

Tunisian sugar industry plans[4].—In addition to the construction of the sugar refinery of Béjà[5], two more factories are planned, one at Souk-El-Arba (for operation in 1967) and the other at Mateur (for operation two years later). It is planned that, by June 1962, production of the Béjà refinery will meet most of Tunisia's annual sugar requirements of about 75,000 tons. Taking account of probable demographic growth, Tunisia will within ten years absorb some 125,000 tons of sugar per year. Initial beet cultivation trials at Béjà were disappointing but improved in following years. During 1958/59 experiments took place on some ten parcels of land, two of which were under irrigation. The results were satisfactory and in the following year beet planting was extended to some 30 hectares. At the same time an advisory service was developed. The planned sugar factory is to process 120,000 tons of beet per year which requires a crop from an area of 7000 ha which, taking the system of crop rotation into account, means that 21,000 ha will have to be made available.

Record Indian sugar production[6].—An all-time record production of sugar of 2·35 million tons was achieved in the current season, according to official figures available in New Delhi.

* * *

New sugar factory for Pakistan[7].—The Pakistan Government has approved the erection of a new sugar factory at Jaipurhat. The Pakistan Industrial Development Corporation expects to receive New Zealand assistance for this project.

* * *

Beet trials in Hawaii[8].—Beets from an unirrigated plot, harvested at 4½ months, weighed up to 5 pounds but gave a crop of only 10·6 tons per acre, and yielded 1·90 tons of sugar per acre. The trials were conducted by Wailuku Sugar Co. on Maui.

* * *

Japan-Taiwan Trade Agreement[9].—Under the terms of a 67¾ million dollar agreement signed between Japan and Taiwan, Taiwan will export to Japan, in the period ending 31st March 1961, $37 million worth of white sugar and $1 million worth of brown sugar, as well as $2 million worth of bagasse board, molasses, etc.

* * *

Bolivian sugar production, 1959[10].—Approximately 19,288 short tons of sugar were produced in Bolivia in 1959. Production in 1960, as estimated by Servicio Agricola Interamericano, will amount to 30,000 tons, an increase of approximately 65%. Inasmuch as national consumption is estimated at approximately 60,000 tons annually, Bolivia should be 50% self-supporting in sugar this year.

* * *

Moroccan sugar industry project[11].—Belgian and Dutch industrialists are investigating the possibilities of developing a sugar industry in Morocco and have entered into an agreement with other interested parties to participate in organising a new sugar company. This will necessitate research on cultivation and processing of sugar cane or sugar beets in Morocco. One of the first objectives is construction of an experimental factory at Port Lyautey.

* * *

Japanese beet sugar[12].—The 1959/60 sugar beet campaign has ended in Japan with a record outturn of 139,535 metric tons from a beet area of 39,388 hecrates. In the previous year, 120,827 metric tons of sugar were produced from 908,014 tons of beet, harvested from 35,234 hectares. A sugar factory at Date was put into operation in 1959 while another is under construction at Bihoro-cho, both in Hokkaido. It is planned to increase the beet area to 59,000 ha by 1963 with a corresponding beet production of 1,550,520 tons.

* * *

Cuba-Japan trade agreement[13].—The talks between representatives of the Japanese Government and a Cuban delegation led by the Minister of Commerce, Dr. CEPERO BONILLA, were brought to a successful conclusion with the signing of an agreement on 22nd April. The pact is to last for a period of three years, during which time the Cuban Government undertakes to endeavour to increase the import of Japanese goods and in particular will abolish the discriminatory restrictions on textiles from Japan. In return the Japanese Government agrees to facilitate the import of major Cuban export items and in particular will endeavour to buy up to 450,000 tons of sugar from Cuba annually. It has been emphasized, however, that this figure is merely a target and does not constitute a commitment.

---

[1] *I.S.C. Stat. Bull.*, 1960, **19**, (6), 15.
[2] *Fortnightly Review* (Bank of London & South America), 1960, **25**, 559.
[3] *Willett & Gray*, 1960, **84**, 175.
[4] *Le Sucre et ses Dérivés*, 20th April 1960.
[5] *I.S.J.*, 1960, **62**, 116.
[6] *Public Ledger*, 28th May 1960.
[7] F. O. LICHT, *International Sugar Report*, 1960, **92**, (4), 39.
[8] *Willett & Gray*, 1960, **84**, 234.
[9] *Willett & Gray*, 1960, **84**, 231.
[10] *Willett & Gray*, 1960, **84**, 141.
[11] *Foreign Crops and Markets*, 21st March 1960.
[12] F. O. LICHT, *International Sugar Report*, 1960, **92**, (5), 41–2, 49.
[13] C. Czarnikow Ltd., *Sugar Review*, 1960, (454), 79.

BREVITIES

Sugar Queen on stamps.—Haiti, one of the Caribbean "sugar islands", is known to stamp collectors for its bright and colourful stamps. The latest issue, however, surpasses all that has gone before. Printed by Courvoisier of Switzerland, these new stamps portray Mlle. CLAUDINETTE FOUCHARD, the "World Sugar Queen" for 1960, against backgrounds depicting Haitian sugar plantations, a sugar harvesting scene and a view of a Haitian beach. Mlle. FOUCHARD was born in Port-au-Prince in 1938 and is the daughter of a Haitian diplomat who is the present head of a long established sugar cane planting family. She was selected from the representative beauties of 42 sugar-producing countries during the Fair of Cali in Colombia.

* * *

Possible new U.S. refinery[1].—The U.S. Sugar Corporation and the Savannah Sugar Refining Corporation are making a study of the possibilities of building a joint refining facility at Canal Point, Florida.

Stock Exchange Quotations

London Stocks (*at 18th July*, 1960)	CLOSING MIDDLE
Anglo-Ceylon (5s)	17/–
Antigua Sugar Factory (£1)	14/6
Booker Bros. (10s)	31/–
British Sugar Corp. Ltd. (£1)	22/9
Caroni Ord. (2s)	4/1½
Caroni 6% Cum. Pref. (£1)	17/–
Distillers Co. Ltd. (10s units)	39/6
Gledhow Chaka's Kraal (£1)	47/6
Hulett & Sons (£1)	47/6
Jamaica Sugar Estates Ltd. (5s units)	5/–
Leach's Argentine (10s units)	17/9
Reynolds Bros. (£1)	36/3
St. Kitts (London) Ltd. (£1)	18/9
Ste. Madeleine (Ord.) (£1)	33/–
Sena Sugar Estates Ltd. (10s)	16/6
Tate & Lyle Ltd. (£1)	56/6
Tate & Lyle Investments Ltd. (5s)	11/–
Trinidad Sugar (5s stock units)	25/6
United Molasses (10s stock units)	38/6
West Indies Sugar Co. Ltd. (£1)	18/3

New York Stocks (*at 16th July*, 1960)	CLOSING MIDDLE $
American Crystal ($10)	43⅛
Amer. Sugar Ref. Co. ($100)	28⅛
Central Aguirre ($5)	23⅜
Cuban American ($10)	14¼
Great Western Sugar Co.	29⅛
South P.R. Sugar Co.	29⅜
United Fruit Co.	21⅜

Beet sugar production in Pakistan[2].—The first beet sugar factory, located at Charsadda Sugar Mill, 20 miles from Peshawar, went into operation on 18th May.

* * *

Bagasse paper in Brazil[3].—A German group is at present visiting Recife, Brazil, to carry out surveys for the installation of a factory for the manufacture of paper and cellulose from sugar cane waste.

* * *

Second Swiss sugar factory[4].—According to the Minister of Economic Affairs, Mr. WAHLEN, the erection of the second Swiss sugar factory will be started next year. It will have an annual processing capacity of 160,000 tons of sugar beets and an annual production capacity of 20,000 tons of sugar. It will be situated at Frauenfeld in the canton of Thurgau. After its completion Swiss sugar production will reach more than 50,000 tons a year and so cover about 25% of the national requirements.

* * *

French sugar projects[5].—Apart from the already licensed erection of a new sugar factory at Chalons-sur-Marne, further sugar factories are projected in Metropolitan France and the French overseas territories. A new sugar factory in the Department of Charente-Maritime has already been approved in principle, while further factories are planned in the Departments of l'Aube, Sarthe, l'Indre and Côtes-du-Nord. At Marie-Galante on Guadeloupe some small sugar factories with obsolete equipment are to be merged and a new modern sugar factory is to be built. Other projects provide for the erection of sugar factories in French Guiana and Algeria.

* * *

British Honduras sugar production, 1958/59[6].—Grinding of the 1958/59 crop continued up to the end of August; some 16,712 tons of sugar were made, compared with 11,000 tons in the 1957/58 crop. Factory expansion work is continuing rapidly and it is anticipated that the initial target of 25,000 tons to fill the quota granted under the Commonwealth Sugar Agreement will be produced during 1961/62. Since construction of the feeder roads for the factory commenced, a total of 33½ miles have been completed and this is expected to speed up delivery of cane.

---

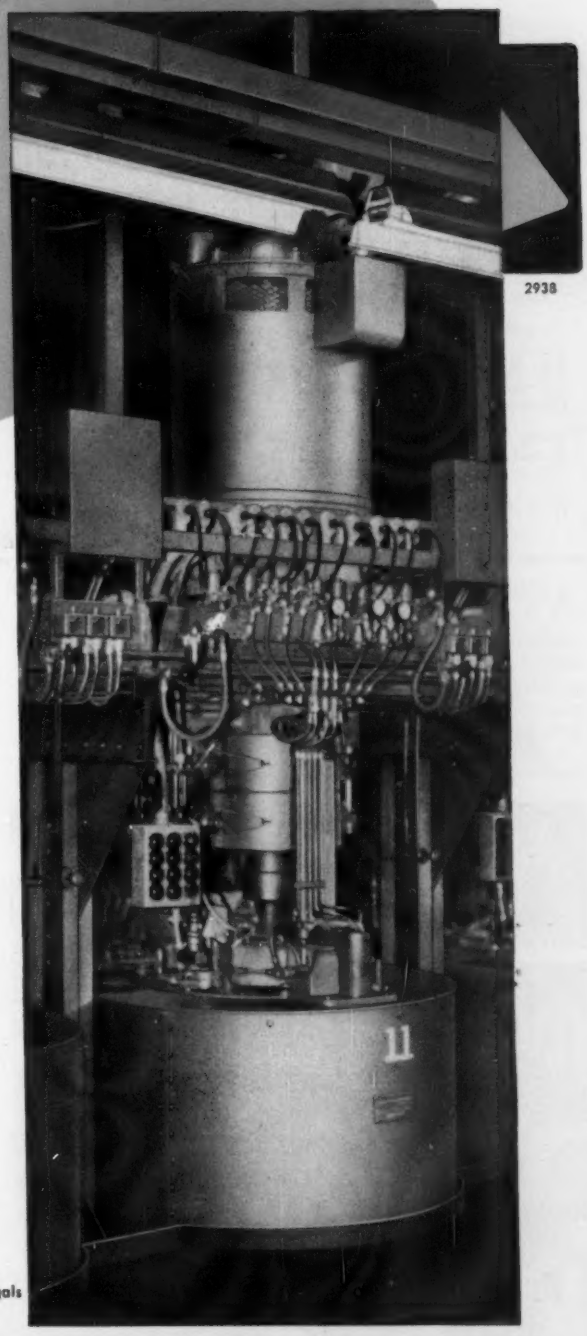
[1] *Lamborn*, 1960, **38**, 120.
[2] F. O. LICHT, *International Sugar Report*, 1960, **92**, (Supp. 13), 156.
[3] *Fortnightly Review* (Bank of London & South America Ltd.), 1960, **25**, 848.
[4] F. O. LICHT, *International Sugar Report*, 1960, **92**, (Supp. 12), 141.
[5] F. O. LICHT, *International Sugar Report*, 1960, **92**, (Supp. 12), 139.
[6] *Overseas Survey* (Barclays D.C.O.), 1960.

Progressive El Potrero

buys

"WESTERN STATES"

for the Eighth Time



El Potrero, one of Mexico's largest and most progressive sugar producers, is quick to apply each new advance in sugar technology. During the past fifteen years they have purchased 35 Roberts Centrifugals. The latest installation consists of 15 machines. All are 100% automatic and incorporate the latest results of Western States experience and engineering.

Western States equipment is the profitable, physical result of Western States thinking.

One of fifteen Roberts G-8 completely automatic centrifugals installed at Ingenio El Potrero, Veracruz, Mexico.

THE WESTERN STATES MACHINE COMPANY

HAMILTON, OHIO, U.S.A.

TO KEEP THE LEAD . . . WE THINK AHEAD.

Index to Advertisers

	PAGE
A.P.V. Co. Ltd.	xxxvi
Ashworth & Parker Ltd.	xliii
Blairs Ltd.	Inside Front Cover, xxvii
Braunschweigische Maschinenbauanstalt	xxxiii
Thomas Broadbent & Sons Ltd.	i
Buckau R. Wolf A.G.	xiii
George Clark & Son (Hull) Ltd.	vi
Clydesdale Chemical Co. Ltd.	xlvii
Cochran & Co., Annan, Ltd.	xxxviii
Cocksedge & Co. Ltd.	xxxvii
George Cohen, Sons & Co. Ltd.	li
A. F. Craig & Co. Ltd.	xxvi
Crofts (Engineers) Ltd.	xxxiv
AB De danske Sukkerfabrikker	xxii
Dorr-Oliver Inc.	Inside Back Cover
Edwards Engineering Corp.	x
Electromagnets Ltd.	ii
Escher Wyss Ltd.	vii
Ewart Chainbelt Co. Ltd.	xlvi
Ferguson Perforating Wire Co.	xlviii
Fisons Pest Control Ltd.	xxv
Soc. Fives Lille—Cail	viii
George Fletcher & Co. Ltd	Outside Back Cover
Fontaine & Co.	xlvi
Goka N.V.	xliv
E. Green & Son Ltd.	xxxv
Gruendler Crusher & Pulveriser Co.	ix
N. A. Helmer	xlvi
John King & Co. (Leeds) Ltd.	xlviii
Kingston Industrial Works Ltd.	xvi
Kleen-e-zee Brush Co. Ltd.	xliv
Link-Belt Co.	xvii
Locker Industries Ltd.	xx
E. C. Masson	xlvi
Mechans Ltd.	xii
Mirrlees Watson Co. Ltd.	iii, xl
Norit	xxxix
Owl Engineering Supplies Ltd.	l
Paterson Engineering Co. Ltd.	xli
Pennine Chainbelt Co. Ltd.	xlii
Pott, Cassels & Williamson Ltd.	xxx
Ransomes, Sims & Jefferies Ltd.	xiv
Renold Chains Ltd.	xix
Sackfilling & Sewing Machine Syndicate Ltd.	iv
Salzgitter Industriebau G.m.b.H.	v
Saunders Valve Co. Ltd.	l
Richard Simon & Sons Ltd.	xlix
G. & A. E. Slingsby Ltd.	xlvii
A. & W. Smith & Co. Ltd.	xxviii, xxix
S.P.E.I. Chim.	xliii
Duncan Stewart & Co. Ltd.	xxxi
Stork-Werkspoor N.V.	xi
Strachan & Henshaw Ltd.	xviii
Suchar Sales Corporation	xxxii
Sugar Manufacturers' Supply Co. Ltd.	xlii, xliv
Watson Laidlaw & Co. Ltd.	xxiv
Western States Machine Co.	xlv
Yorkshire Imperial Metals Ltd.	xv

FOR BUYERS' GUIDE SEE JULY ISSUE pp. xliii-lvii

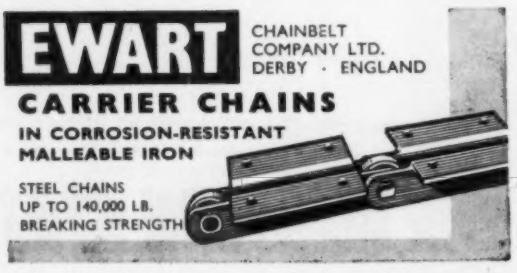
ASSISTANT CHEMIST required for sugar factory in Trinidad. Bachelor with some factory experience preferred. Four year contract, starting salary £900 per annum, free quarters and medical attention, four months leave on completion of contract. Apply, with particulars of education, training and experience to Box No. 415, *The International Sugar Journal Ltd.*

N. A. HELMER
Member A.S.M.E.
CONSULTING ENGINEER
Representing
The Mirrlees Watson Company Limited, Glasgow, Scotland
Pott, Cassels & Williamson Limited, Motherwell, Scotland
POST OFFICE BOX 54—PLAINFIELD, N.J., U.S.A.

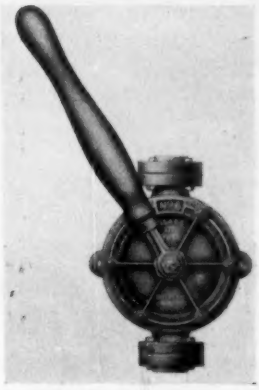
FONTAINE
Serving the Sugar Industry for more than 100 Years
Perforated Sheets of all Types
Speciality: Small Perforations
FONTAINE & CO. GMBH. · AACHEN W.-GERMANY

POSITION VACANT. Owing to the death of one of our senior staff, we have a vacancy in our Glasgow works for the position of Works Manager. Would those interested in this appointment please write to the Managing Director at the address below, stating their experience in the sugar industry and machinery manufacture, their present salary and the salary they would require. All communications will be treated as confidential and envelopes should be marked W.M.—A. & W. Smith & Co. Ltd., 21 Mincing Lane, London E.C.3, England.

E. C. MASSON Member A.S.M.E.
CONSULTING ENGINEER
CANE SUGAR MILLS & REFINERIES
Engineering & Construction — Improvements & Expansion
FACTORY AUTOMATION
P.O. Box 45-484 MIAMI 45, FLORIDA Telephone:
Cables: NOSSAM U.S.A. Highland 3-3025



SEMI-ROTARY PUMPS



DOUBLE ACTING TYPE

sizes ½" to 3"
Capacities from 150 to 4,200 gallons per hour
In Cast Iron, Brass or Gunmetal

G. & A. E. SLINGSBY LTD.

CLEVELAND STREET
HULL
Phone: 20601 (5 lines)
Phone: 20601 (5 lines)

FOR SALE

COMPLETE RAW SUGAR FACTORY WITH STEEL BUILDING

includes Knives, 15 roll 24 × 42 Mill, Furnaces equipped with new Liptak Arches, Bach Subsider, Eimco Filter, Repair workshop and chemical Laboratory. Plant capacity 750 tons cane per day; thoroughly maintained, now taking off 1960 Crop.

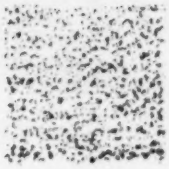
Full particulars obtained from:

ROSE HALL LIMITED
MONTEGO BAY,
JAMAICA W.I.

is yours a

DECOLOURISING

problem



. . specify

ACTIBON

THE HIGHLY ACTIVATED DECOLOURISING CARBON

IT'S CRYSTAL CLEAR

THE CLYDESDALE CHEMICAL CO., LTD.

SALES OFFICE
142 QUEEN STREET, GLASGOW, C.1.
Phone: Central 5247-8 *Grams*: "Cactus" Glasgow

FINEST *to the* **COARSEST**
IN PERFORATED METAL AND WIRE CLOTH

WIRE CLOTH

and FERGUSON

specializes in perfection

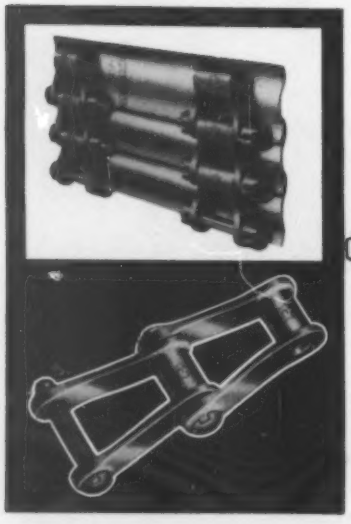
Whatever your filtering needs may be, Ferguson will supply you with a custom tailored filter leaf that will do the job better. Ferguson tubular slit filter leaves last longer, and will outperform ordinary filter leaves in any operation.
Whether you require a fine or a coarse screen, Ferguson has the perforated metal best suited for the job.

FERGUSON PERFORATING & WIRE CO.
130-140 ERNEST STREET, PROVIDENCE 5, RHODE ISLAND
SEND FOR CATALOGUE

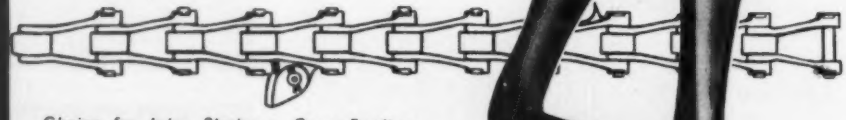
Equipment Specialists for Sugar Mills

JOHN KING of LEEDS

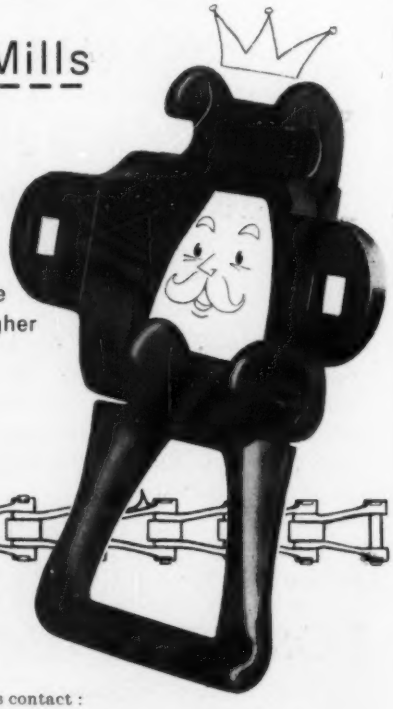
'Climax' malleable iron has greater comparative resistance to sugar acid corrosion, whilst our special 'Klimal' metal combines this important feature with longer wearing and higher anti-shock qualities.



CARRIER SLATS — *Standard sizes and shapes available for all sugar carrier chains. Close working faces prevent material jamming between slats.*



Chains for Juice Strainers, Cane Feeding Tables, etc., etc.



For details regarding any equipment or information about any special problems contact :

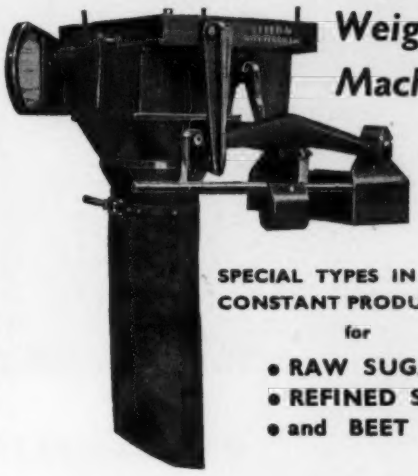
JOHN KING & CO. (LEEDS) LTD. GARNET ROAD, LEEDS 11
Phone: 75414 (4 lines) Grams: Malleable Leeds 11
We can supply Elevators · Conveyors · Hoppers · Bunkers and Buckets of all types

CONTINUOUS BELT WEIGHER

for weighing whole beets or cossettes

Specially adapted for controlling the speed of cutting mills relative to weight for Continuous Diffusion Plants

Automatic and Sackfilling Weighing Machines



SPECIAL TYPES IN CONSTANT PRODUCTION for

- **RAW SUGAR**
- **REFINED SUGAR**
- **and BEET PULP**

RICHARD SIMON & SONS LTD.

PHOENIX WORKS, BASFORD, NOTTINGHAM

Telephone: 75136-7-8 *Telegrams:* "Balance, Nottingham"

The Australian Sugar Journal

A MONTHLY JOURNAL issued by the AUSTRALIAN SUGAR PRODUCERS ASSOCIATION LTD.

Circulates throughout the sugar-producing districts of Australia.

It has in addition a substantial international subscription list.

Subscription Rates :

One pound (£1) (Australian) per annum.

For advertising rates, write :

G.P.O. Box 608J, Brisbane, Queensland.

GILMORE SUGAR MANUALS

MANUAL AZUCARERO DE CUBA
THE CUBA SUGAR MANUAL
(In Spanish). Published Annually—1959 Edition now available.

THE HAWAII SUGAR MANUAL
Published every Third Year—1957 Edition now available.

THE PUERTO RICO SUGAR MANUAL
(including Dominican Republic and Haiti)
Published every other year—1959 Edition now available.

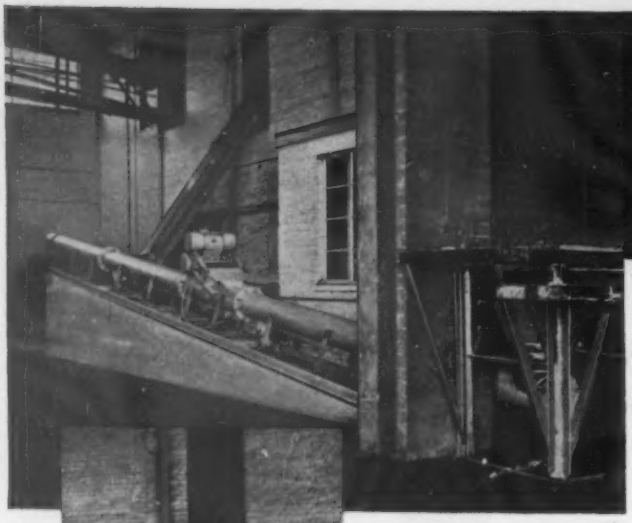
THE LOUISIANA-FLORIDA SUGAR MANUAL
Published every other year—1959 Edition available.

Each $10.00 per copy (post paid)

★ *Detailed Technical Surveys on Agricultural and Manufacturing Practices of the Cane Sugar Industry*

GILMORE PUBLISHING CO., INC.

525 Audubon Bldg., New Orleans 16, Louisiana, U.S.A.



'OWL'
VIBRATORY CONVEYORS
for the Sugar Industry

'Owl' Vibratory Conveyors are specially suited to many of the requirements of the sugar industry. This conveyor, installed at The British Sugar Corporation, Selby, is 10 in. dia., 40 ft. long, with a capacity of 25 tons per hour up an inclination of 7°, taking 3 h.p.

'Owl' Vibratory Conveyors are the most economical method of conveying any loose material, cold or hot, heavy or light.

Write for full particulars to :—

OWL ENGINEERING

A member of the JOHN THOMPSON GROUP

OWL ENGINEERING SUPPLIES LTD

TRIUMPH WORKS KIRKSTALL ROAD LEEDS 4 'Phone 3-3641

OB

Leyland Motors Limited employ 6 SAFRAN Unishaft Electric Pumps (3"/4": 2½"/3") to supply 10,500 G.P.H. of cooling water to the engine test benches.

SAFRAN
REGISTERED TRADE MARK
PUMPS

SAUNDERS VALVE COMPANY LIMITED
SAFRAN PUMP DIVISION
DRAYTON STREET WOLVERHAMPTON

BASIC CALCULATIONS FOR THE CANE SUGAR FACTORY

By J. EISNER
(Technical Adviser, Booker Bros. McConnell & Co. Ltd.)

This book is intended for use by the men who work in sugar factories and are responsible for the day-to-day operation of plant and process, and who have not the time—or inclination—for studying voluminous textbooks. Of convenient size and style it will be the valued companion of all cane sugar men.

Price: **7s. 6d.** or **$1·00** U.S. post-free.

Obtainable only from *The International Sugar Journal Ltd.*, Central Chambers, The Broadway, London, W.5.

ZEITSCHRIFT FUER DIE ZUCKERINDUSTRIE

For the last 80 years the *ZEITSCHRIFT FUER DIE ZUCKERINDUSTRIE* (formerly *Die Deutsche Zuckerindustrie*) has been the authoritative German periodical for sugar technology and sugar economics. Each issue contains several original scientific and practical articles written by expert authors. The articles are prefaced by summaries in English and French. In addition, reports on the technical progress of sugar throughout the world and statistical data of world sugar economy are regularly published.

SAMPLE COPIES WILL BE SENT FREE OF CHARGE ON REQUEST

Yearly Subscription Price : DM30.-
(postage included)

PUBLISHED EVERY MONTH

ZEITSCHRIFT FUER DIE ZUCKERINDUSTRIE
Berlin-Nikolassee, Germany
Lueckhoffstr. 16.

GUARANTEED

PROCESS PLANT

FROM OUR LONDON STOCKS

★ HORIZONTAL POWDER MIXER by Gardner, 300 lb. capacity, size GG, mild steel trough 5 ft. x 18 in. x 23 in. deep with safety grill, hinged lid and bottom end slide outlet. Removable broken scroll agitator driven by 2 h.p. motor enclosed in end support pedestal with built-in push button starter.

★ ADELPHI HORIZONTAL POWDER MIXER, 400 lb. capacity, mild steel trough 4 ft. 6 in. x 24 in. x 24 in. with cover, side feed opening and bottom centre outlet. Broken scroll agitator driven by spur gear and pinion and vee pulley from 4 h.p. motor, 6 in. dia. Inclined Worm Feeder with feed boot, flange bolted on to side of trough, drive by 1 h.p. motor.

★ PORCELAIN LINED COBORN BALL MILL, 45 gallons working capacity, mild steel casing 40 in. dia. x 36 in. long, mounted on fabricated end frames with self-aligning plummer blocks. Drive by 3 h.p. motor with push button starter. Ball charge available.

★ NEW JAW CRUSHER by Nikex, single-toggle, 31¼ in. x 15¼ in., capacity 25/30 t.p.h. when flywheel rotates at 250 r.p.m. 40/50 h.p. required to drive. Main frame and pitman constructed ribbed cast steel, jaws and cheekplates manganese steel. Forced feed lubricating to bearings, main and pitman bearings water cooled. One flywheel grooved for vee ropes.

★ PORTABLE CRUSHING & SCREENING PLANTS, four-wheel chassis type carrying 16 in. x 9 in. Jaw Crusher and underslung Rotary Screen, Diesel Engine driven. Manufacturers: *Pegson, Parker, Marsden.*

★ VACUUM OVEN by Francis Shaw, 5 ft. 2 in. wide x 8 ft. 9 in. long x 7 ft. high internally with heavy cast iron swing door each end having four corner wheel operated swing clamps, sight glasses, lamps and aircocks. Internal headers with swan neck connections to 17 steam heated platens of welded/riveted construction suitable 40 p.s.i. w.p.
FIVE AVAILABLE, mild steel welded construction.
TWO AVAILABLE cast iron construction.

★ TWIN ROLL BUFLOVAK DRIER by *Consolidated Products, U.S.A.*, 100 in. x 32 in., type 700 serial, rolls suitable 100 p.s.i. w.p. Driven through enclosed chains, reduction gear and vee ropes by 5 h.p. motor. TWO AVAILABLE.

★ SYMONS 'JW' TYPE SCREEN by *Nordberg*, 42 in. x 6 ft., vee belt driven by 5 h.p. S.C. motor by *L.D.C.*, 1440 r.p.m. 400/3/50 cycles. THREE AVAILABLE.

★ CENTRIFUGAL EXTRACTOR by *Broadbent*, 36 in. dia. Lift-out mild steel basket with ¼ in. perforations, three-point suspension, spring balanced lids with safety interlock and hand brake. Underdriven direct coupled 12/13 h.p. motor with auto starter.

These are representative items from our wide range of new and reconditioned Plant. Comprehensive stocks also include:

Power Plant, Machine Tools, Hydraulic Plant, Contractors' Plant, Lifting and Mechanical Handling Equipment

May we put you on our mailing list?

GEORGE COHEN
SONS & COMPANY LTD
ESTABLISHED 1834
LONDON, W.12 Cables: OMNIPLANT TELEX, LONDON
TELEX No. 21288/9

"Brasil Açucareiro"

OFFICIAL ORGAN *of the* BRAZILIAN INSTITUTE OF SUGAR & ALCOHOL
(INSTITUTO DO AÇÚCAR E DO ÁLCOOL)

A MONTHLY MAGAZINE containing complete news and specialized contributions on Brazilian and international sugar agriculture and industry.

Annual Subscription:

Brazil ..... Cr.$100.00
Foreign Countries ..... Cr.$150.00
Single Copies ..... Cr. $10.00
Back Copies ..... Cr. $15.00

Remittances must be made in the name of

INSTITUTO DO AÇÚCAR E DO ÁLCOOL
Praça 15 de Novembro, 42,
Rio de Janeiro,
BRASIL.
Caixa Postal 420.

THE SOUTH AFRICAN SUGAR JOURNAL

covering the

Sugar Industries of NATAL, ZULULAND, MOZAMBIQUE and EAST AFRICA

Since 1914

The *South African Sugar Journal* has presented planters and millers in the territories for which it caters with authoritative reviews of developments in all fields of sugar cane technology.

FREE SAMPLE COPY SENT ON REQUEST

Subscription and Advertising Rates available from

THE SOUTH AFRICAN SUGAR JOURNAL
P.O. Box 1209
London Assurance House, Smith Street, Durban, South Africa.
Telephone 25612

SUGAR NEWS

A MONTHLY JOURNAL DEVOTED TO THE INTERESTS OF THE PHILIPPINE SUGAR INDUSTRY

Published by:
THE SUGAR NEWS PRESS INC.

FEATURES

Results of research and experiments in fields and mills, and other important developments in the Philippine sugar industry of interest both to technical men and laymen ; sugar production, prices, and market news and statistics ; write-ups on other important and allied industries in the Philippines, etc.

SUBSCRIPTION

$7.50 U.S. Currency, per annum, post free *for U.S.A. and its possessions*

$10.00 U.S. Currency, per annum, post free *for other foreign countries*

WRITE FOR A FREE SPECIMEN COPY AND FOR ADVERTISING RATES.

Publishing Office:
417 Dasmariñas, 316 Doña Salud Building, Manila, Philippines.

CUBA SUGAR YEAR BOOK

New Edition (Spanish-English containing **SUGAR CENSUS** corrected to date, informative data and alphabetical index of Sugar Mills, giving situation, ownership, year founded, nationality, characteristics, total employees, yield (%), total cane ground, production and export of sugar, molasses, syrups, alcohol, cane brandy, aguardiente, rum.

Also lands owned and leased, colonos, days grinding, record and maps of rainfall, price of sugar and value of crops. Maps of Cuba showing ports, landings, distances, railways, roads, air communications, telegraph, cable and telephone connexions. Graphs with cane and cane products data. Bonded warehouses, taxes, and legislative measures enacted touching the industry.

Directories with over 3000 names and addresses of official and private organizations, business firms, cane growers (Colonos), department heads, producers, shippers, etc.

Foreign Section : Sugar production in U.S. and other countries (beet and cane). Imports and distribution of sugar and by-products in U.S. World demand and consumption, quotas, distribution, transport, etc.

$5 post paid

Edited by :
CUBA ECONOMICA Y FINANCIERA
POST OFFICE BOX 2549, HAVANA, CUBA
Teleph. M-3148 Lonja 441-442

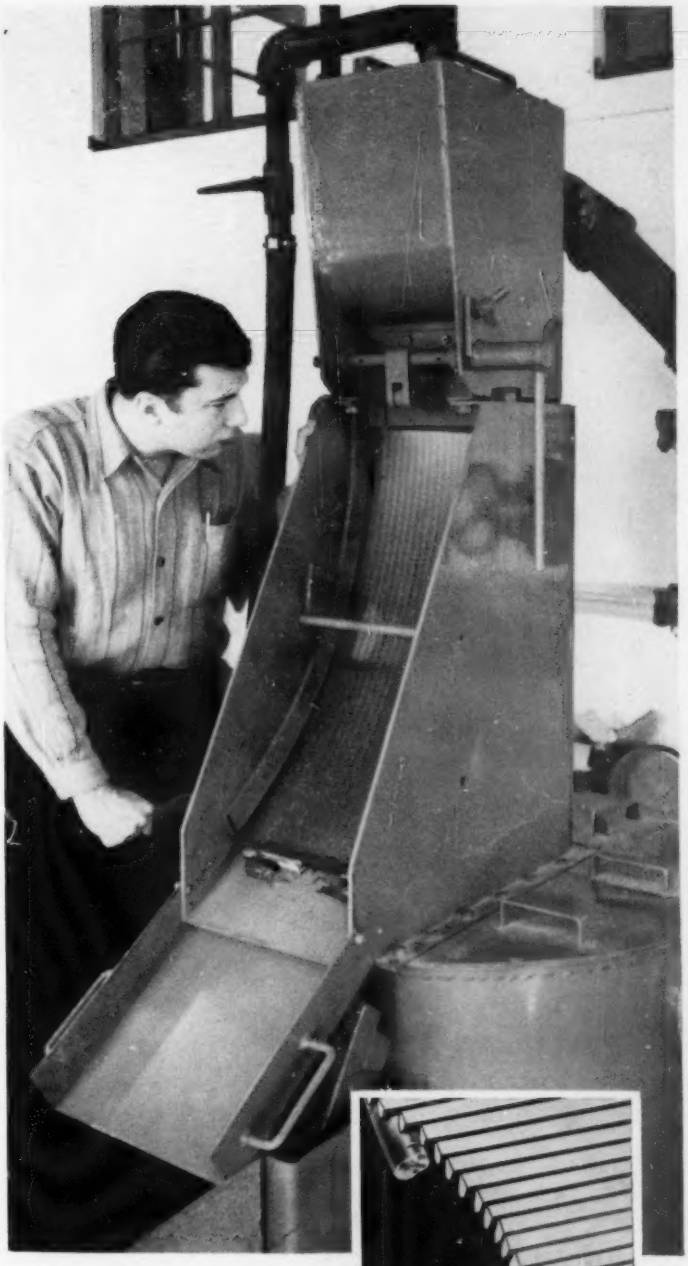
A NEW WAY TO SEPARATE FIBER FROM CANE JUICE...

The DORR-OLIVER DSM® SCREEN

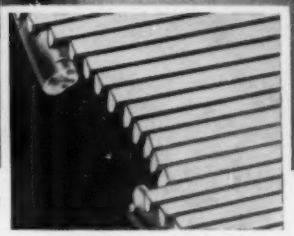
Latest addition to Dorr-Oliver's line of sugar processing equipment is the DSM Screen. A radical departure from normal practice, the DSM offers many advantages over conventional screens. It consists of a stationary housing equipped with a concaved wedge bar type screen with provisions for introducing feed and withdrawing fiber and juice.

In operation, juice enters the feed box and is fed by gravity tangentially onto the upper surface of the screen. Flowing down the concave surface at right angles to the openings between the wedge bars, the juice passes through these apertures and is collected in the screen box. Fibers pass down the screen surface and are dewatered prior to discharge.

For further information on the DSM Screen for separating fiber from cane juice, write to Dorr-Oliver Incorporated, Stamford, Conn., U. S. A.



A DSM Screen installation showing simplicity of design and overall compactness.



Closeup showing detail of wedge bar design.

ADVANTAGES OF THE DORR-OLIVER DSM SCREEN

- Wedge bar design promotes high screening efficiency and essentially a non-blinding screen.
- The DSM is a compact unit which can be installed with a minimum of effort.
- Stationary design with no moving parts means low operating cost and minimum maintenance.

DORR-OLIVER

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

FLETCHER

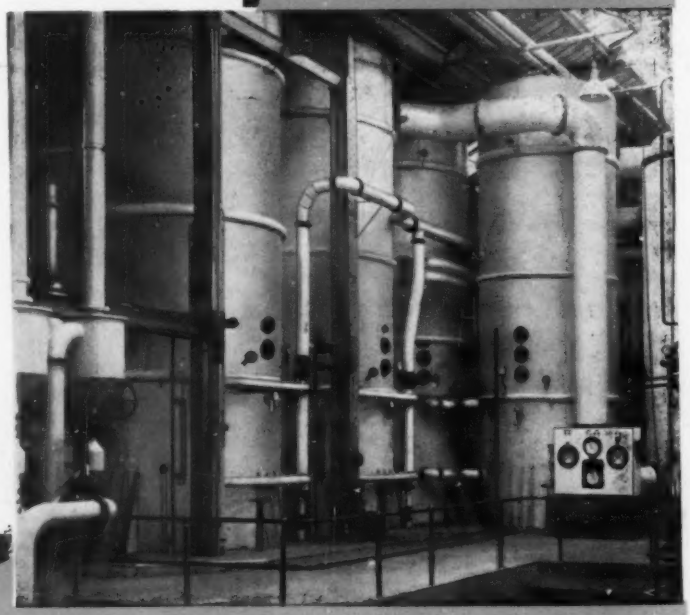
AND SUGAR BEET

The four evaporator vessels shown were manufactured by us as a repeat order and installed in the Ipswich factory of the British Sugar Corporation, each vessel being 9′ 0″ in dia., with a heating surface of 8600 sq. ft.

Confidence in FLETCHER is not confined to Britain alone. From sugar growing areas all over the world the demand for FLETCHER plant is growing, so much so that we now offer to install COMPLETE CANE AND BEET SUGAR FACTORIES anywhere in the world.

Complete plant for the sugar industry

CANE KNIFE SETS—MAXWELL SHREDDERS
FLETCHER MILLS—"ATLAS METAL"
MILL ROLLERS—MAXWELL-BOULOGNE
LIQUID SCALES—JUICE HEATERS
FORTIER CLARIFIERS—FILTER PRESSES
SEALED DOWNTAKE EVAPORATORS
CENTRE FLOW PANS—DRY AIR AND CO_2 GAS PUMPS—FLETCHER CRYSTALLISERS
AMARILLA ROTARY DISPLACEMENT PUMPS FOR MASSECUITE & VISCOUS LIQUIDS



GEORGE FLETCHER & CO LTD

MASSON WORKS · LITCHURCH LANE · DERBY · ENGLAND · TEL: DERBY 45817 · GRAMS: "AMARILLA" DERBY

P4688/AG

Printed by JOHN ROBERTS & SONS, Salford, Manchester; and published by the Proprietors, THE INTERNATIONAL SUGAR JOURNAL LTD., at Central Chambers, The Broadway, London, W.5. Entered at the New York Post Office as Second-Class Matter. Registered for transmission by Canadian Magazine Post.

PRINTED IN GREAT BRITAIN.